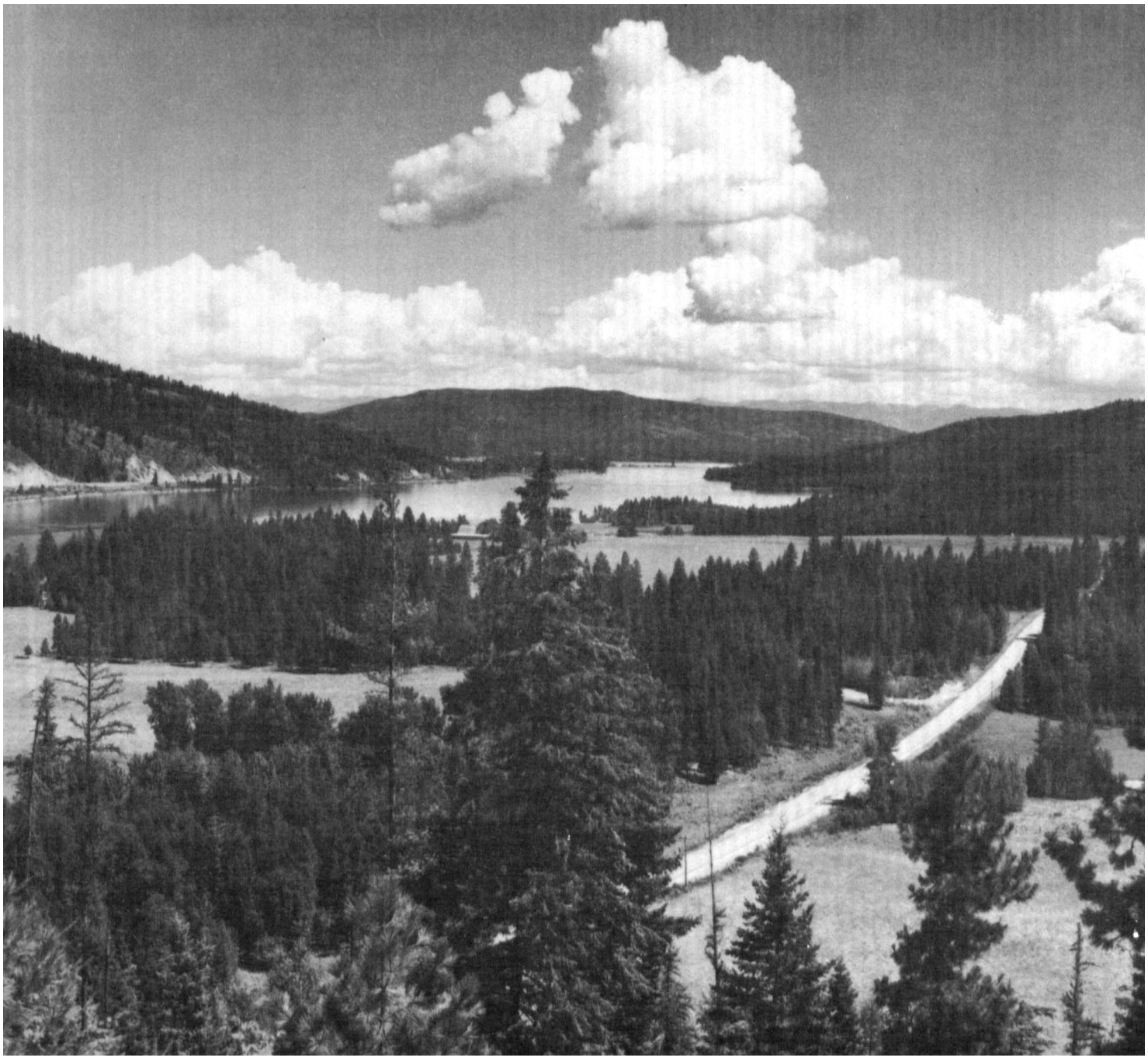
United States Department of Agriculture

Soil Conservation Service

In Cooperation with the University of Idaho, College of Agriculture, and the Idaho Soil Conservation Commission

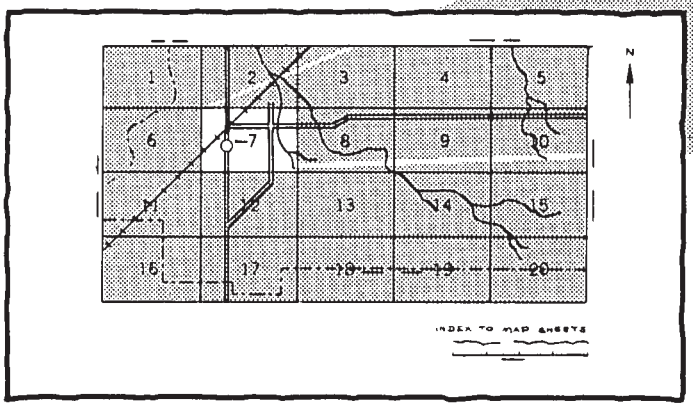
Soil Survey of the Bonner County Area, Idaho

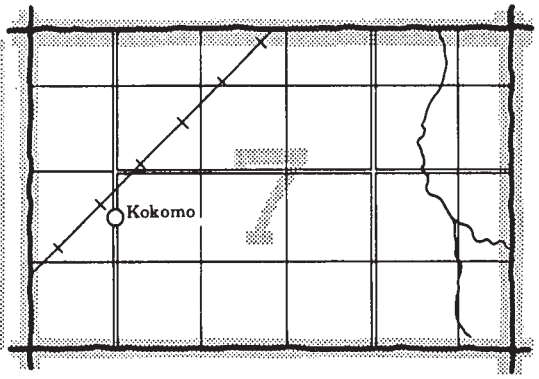
Parts of Bonner and Boundary Counties, Idaho



HOW TO USE

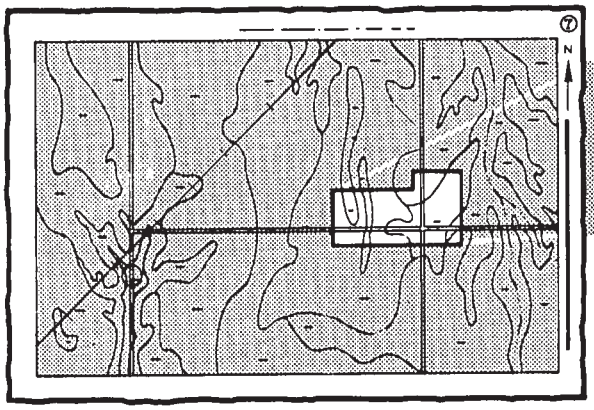
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

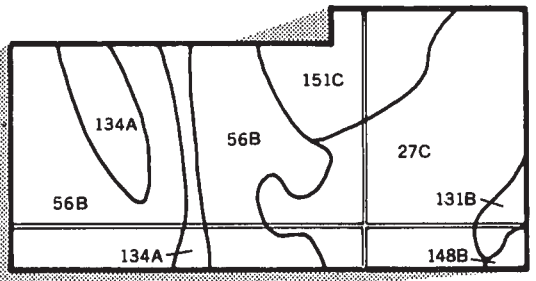




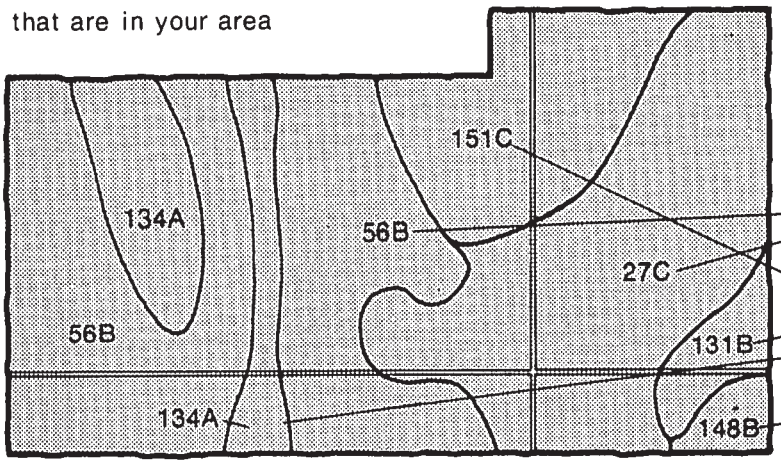
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





4. List the map unit symbols that are in your area

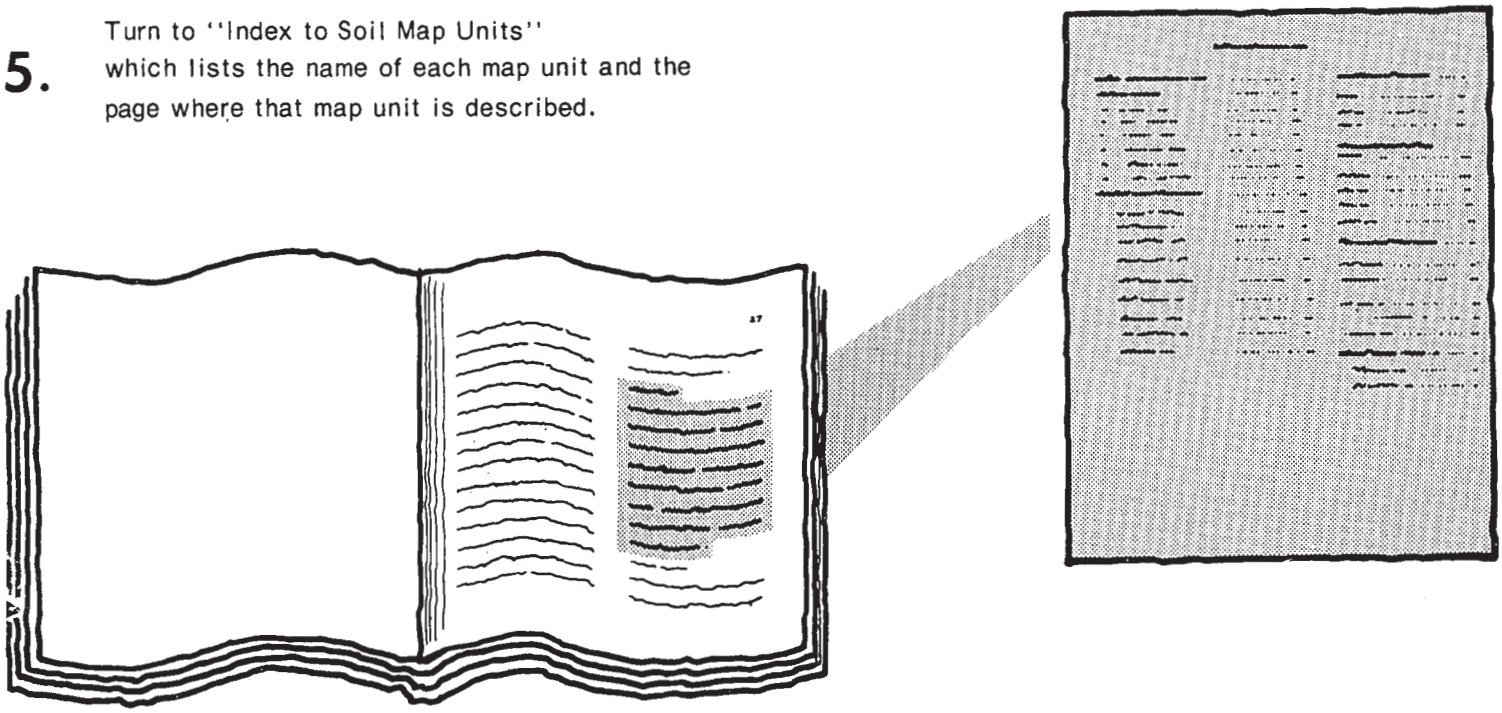


Symbols

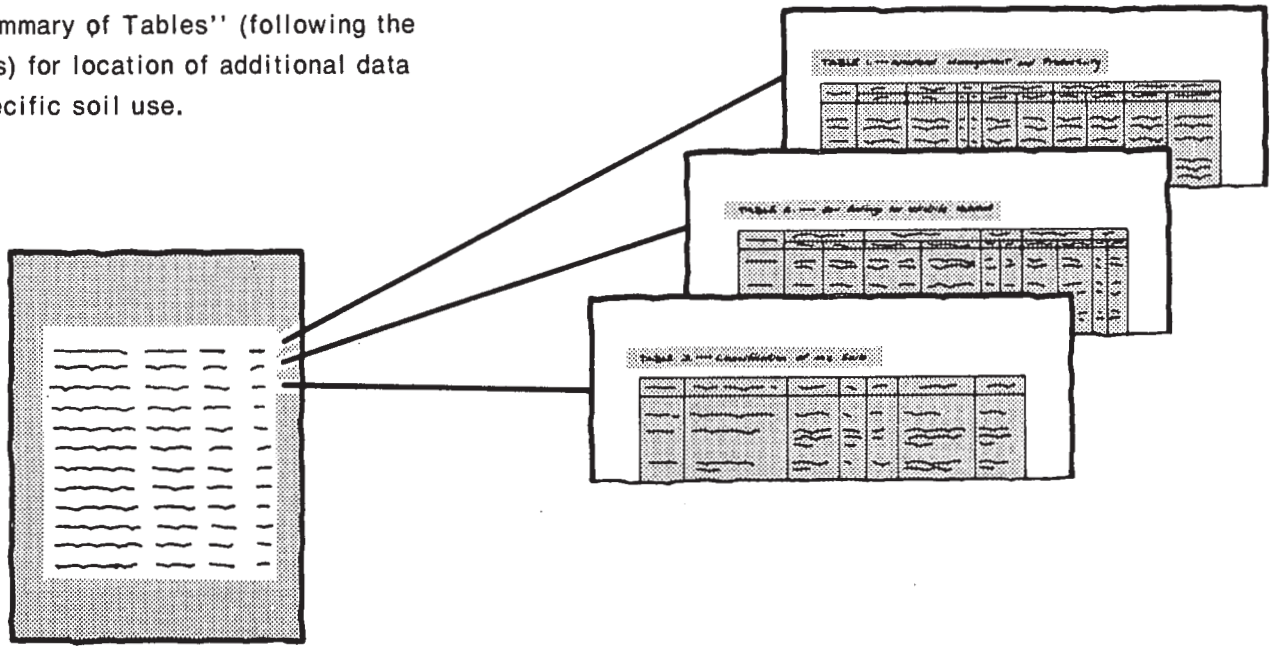
- 27C
- 56B
- 131B
- 134A
- 148B
- 151C

THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was performed in the period 1975-80. Soil names and descriptions were approved in 1981. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1980. This survey was made cooperatively by the Soil Conservation Service and the University of Idaho, College of Agriculture, and the Idaho Soil Conservation Commission. It is part of the technical assistance furnished to the Bonner Soil Conservation District.

Cover: Mission and Bonner soils on the flat terraces along the Pend Oreille River; Pend Oreille and Treble soils on the foothills and mountains.

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soil series

Issued November 1982

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foreword

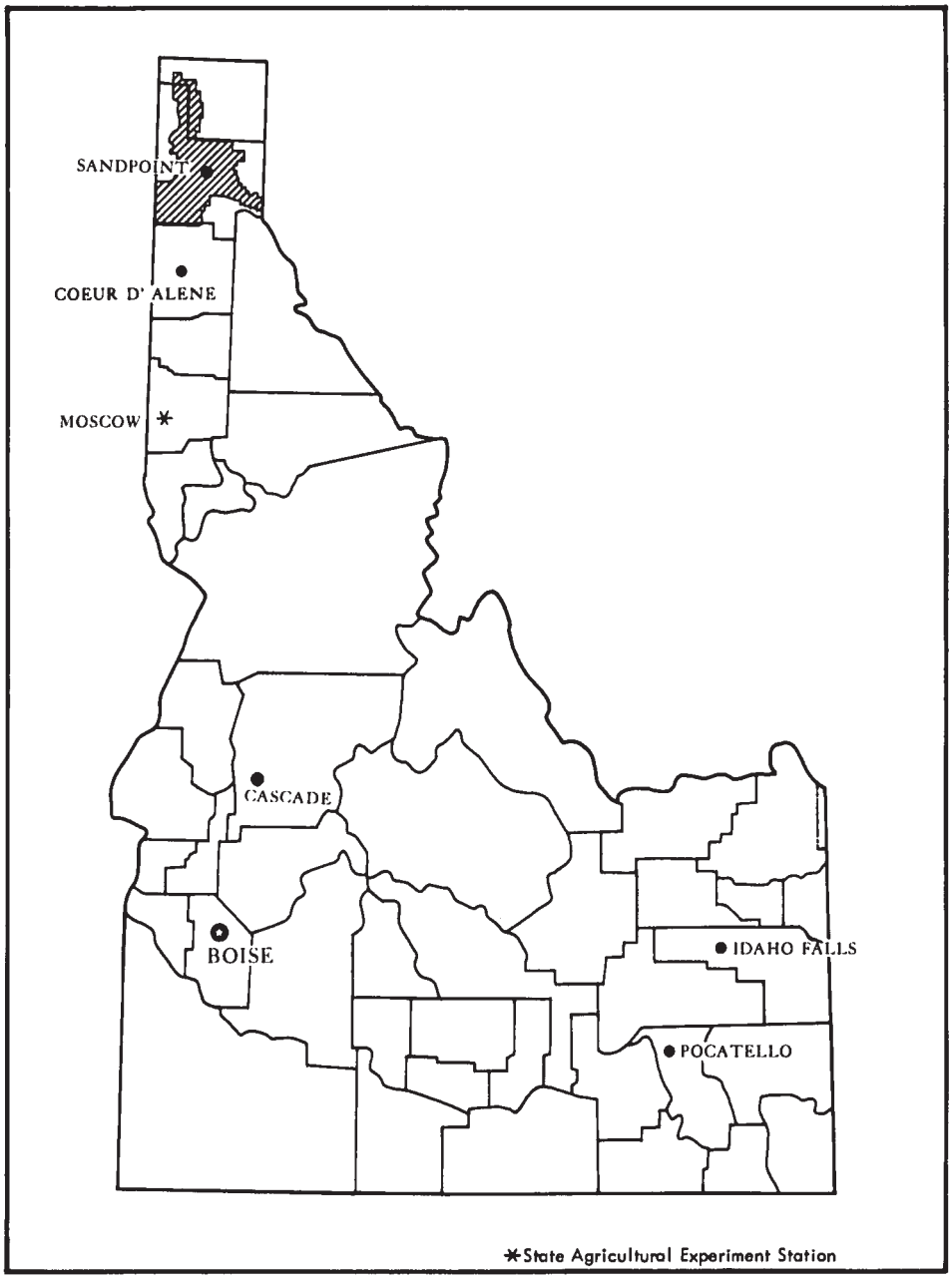
This soil survey contains information that can be used in land-planning programs in Bonner County Area. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Amos I. Garrison, Jr.
State Conservationist
Soil Conservation Service



Location of Bonner County Area in Idaho.

soil survey of
Bonner County Area, Idaho
Parts of Bonner and Boundary Counties

By Charles J. Weisel, Soil Conservation Service

Fieldwork by Charles J. Weisel and Philip M. Hartwig,
Soil Conservation Service,
and Steven D. Keirn and Barry J. Turner,
Idaho Soil Conservation Commission

United States Department of Agriculture, Soil Conservation Service, in cooperation with the University of Idaho, College of Agriculture, and the Idaho Soil Conservation Commission

BONNER COUNTY AREA is in the northern part of the panhandle of Idaho. It includes most of Bonner County, except contiguous parts of the Kaniksu National Forest, and a small part of Boundary County east of Priest Lake. The total area is 670,620 acres, or about 1,048 square miles. Sandpoint, the county seat of Bonner County, had a population of 4,459 in 1980.

The survey area consists of rugged, forested, mountainous or hilly terrain and of comparatively narrow valleys that open to the south. The glacially sculptured Selkirk Mountains are in the northern and western parts of the area, and the Cabinet Mountains are in the eastern part. Most prominent of the valleys in the area is the Selle Lowland, which is an extension of the Purcell Trench north of Sandpoint. Other valleys include the Clark Fork Valley, in the eastern part of the area; the Priest River Valley, in the northwestern part; and Blanchard, Hoodoo, and Cocolalla Valleys, in the southern part.

The survey area is dotted with many lakes, both large and small. Pend Oreille Lake is the largest natural lake in Idaho. The Clark Fork and Pend Oreille Rivers, which flow from east to west across the area, are the principal drainageways. Priest River is the main drainageway that flows north from Priest Lake.

The lowest point in the area, which is about 2,030 feet in elevation, is the level of the Pend Oreille River at the Washington–Idaho state line. The city of Sandpoint, situated on a delta at the northern end of Pend Oreille Lake, is about 2,100 feet. The highest elevations are in the northern part of the area, where some mountain peaks are more than 7,000 feet high.

An older survey of Bonner County was published in 1939 (*7*). The present survey updates the earlier survey and provides additional information and larger maps that show the soils in greater detail.

Descriptions, names, and delineations of soils in this soil survey do not fully agree with those on soil maps for adjacent counties. Differences are the result of better knowledge of soils, modifications in series concepts, intensity of mapping, or the extent of soils within the survey area.

general nature of the survey area

This section gives general information concerning the Bonner County Area. It discusses history and development, natural resources, farming, and climate.

history and development

David Thompson, representing the Northwest Fur Company, established Idaho's first trading post in 1809 on the shores of Pend Oreille Lake. The trading post,

called Kullyspell House, was about 5 miles from the present site of the town of Hope.

As early as 1840 Father Pierre Jean DeSmet, a Catholic missionary among the Indians, was a frequent visitor to this part of Idaho. In 1860 the Hudson's Bay Company established a trading post at Seneaquoteen, located near the present town of Laclede. Seneaquoteen is situated at a comparatively narrow place on the Pend Oreille River, where the Indians were accustomed to crossing.

The discovery of gold near Helena, Montana, largely influenced the establishment of mail and freight routes across northern Idaho and Pend Oreille Lake. After being transported across the lake by boat from Bayview, Idaho, to Woodland, Montana, goods were put on pack animals and taken overland to Helena.

In 1864 the steamer "Mary Moody" and two other boats were built at Seneaquoteen to pick up mail at steamboat landings and transport it across the lake to a settlement near the present site of Sandpoint. The first post office in the area was established in 1880 in a little village called Venton, about 3 miles across the lake from Sandpoint.

In the late 1800's logging was begun throughout the area and has continued to be the major industry. As large areas were cleared, homesteaders began to establish farms. Farming, along with associated stores and small businesses, has become the second most important industry in the area.

Bonner County was established in February, 1907, when Kootenai County was divided. The northern half was called Bonner in honor of E. L. Bonner, who established the first ferry across the Kootenai River at the present site of Bonners Ferry. The seat of government was established at Sandpoint, the principal city of Bonner County today. Other cities and communities in the county are Priest River, Clark Fork, Ponderay, Kootenai, Hope, East Hope, Oldtown, Blanchard, Dover, Laclede, Colburn, and Coolin. The population of these communities has fluctuated with the degree of activity in the lumber industry.

Transportation facilities are presently supplied by railroads, highways, and an airport at Sandpoint. The area is served by two freight lines, Burlington Northern and Spokane International. The city of Sandpoint has the only rail passenger depot in northern Idaho, which is operated by Amtrak.

Graded roads, many of which were built mainly for logging, extend along the principal streams in the forested areas. Two major highways run through Bonner County. State Highway 200 runs east and west, and U.S.Highway 95 runs north and south.

Sandpoint, Priest River, and Clark Fork have grade school and high school facilities. The outlying areas are well supplied with district schools.

Lumbering and the forest products industry continue to be very important to the economy of the area. Several forest products plants are at Sandpoint, and others are throughout the area.

natural resources

Soil, water, and timber are the most important natural resources in the survey area. Livestock, crops, and timber are marketable products derived from the soil. Millions of board feet of lumber are cut annually from ponderosa pine, lodgepole pine, western white pine, grand fir, Douglas-fir, western larch, western redcedar, western hemlock, and spruce. Boards, poles, posts, shingles, and shakes are among the main products of the forest industry, while small logs and chips are used in the pulp industry. Some local timber is also used for veneer.

The survey area has abundant water resources. Pend Oreille and Priest Lakes and the three major rivers—the Clark Fork, Pack, and Priest Rivers—dominate the landscape. Overall, water quality in the area is considered to be excellent. Large quantities of ground water and the principal recharge area for the Rathdrum aquifer are in the southern part of the area. Wetlands are scattered throughout the area, but the major areas are adjacent to the Pend Oreille and Pack Rivers.

Most of the mining in the area is for the production of sand and gravel. These deposits are plentiful almost everywhere at the lower elevations in the area. A few metallic ore mines are being operated, but work is restricted to exploration and assessment. Clay deposits, especially in the Clark Fork and Cabinet areas, have the potential for commercial use as ceramic clay or as sealants and stabilizers.

farming

About 80,000 acres in the survey area is used for hay, pasture, and crop production (*12*). Most of this acreage is dry-farmed. A small acreage, mainly of droughty soils, is under sprinkler irrigation. Grass-legume hay, wheat, oats, and barley are the major crops. Yields are only low to moderate compared with those in nearby counties because of the cool temperatures and short growing season.

Most cropland in the area is cutover timberland. A small percentage is wet bottom lands and meadows. Most of the farms are part-time enterprises that are supplemented by off-farm employment or by income from the timber industry. Christmas tree production is proving quite profitable where proper management is used.

Livestock grazing is becoming more important to the economy of the area. The livestock operations are cow-calf or beef enterprises, generally including less than 100 cows. There are about 30 Grade A dairies that furnish milk for the Spokane, Washington, area. A cheese factory located in Sandpoint provides a market for surplus Grade A milk.

The average size of farms in the area is about 300 acres, of which about 75 acres is cropland and the rest is woodland or pastureland. Among the specialty crops grown in the area are seed potatoes, berries, apples, and peas.

The Bonner Soil Conservation District was formed on July 15, 1946. Originally, the District's purpose was to conserve the soil resources of Bonner County, but it has expanded recently to include the conservation and development of all natural resources.

climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Summers in the survey area are warm to hot in most of the valleys but are much cooler in the mountains. Winters are cold in the mountains. The valleys are colder in winter than the lower slopes of the adjacent mountains because of cold air drainage. Precipitation occurs in the mountains throughout the year, and a deep snowpack accumulates during winter. Snowmelt usually supplies much more water than can be used for agriculture in the area. In valleys precipitation in summer falls mainly as showers, although some thunderstorms occur. In winter the ground is covered with snow much of the time. Chinook winds, which blow downslope and are warm and dry, often melt and evaporate the snow.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Sandpoint, Idaho, for the period 1951 to 1978. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 29 degrees F and the average daily minimum temperature is 23 degrees. The lowest temperature on record, which occurred at Sandpoint on December 30, 1968, is -37 degrees. In summer, the average temperature is 63 degrees and the average daily maximum temperature is 78 degrees. The highest recorded temperature, which occurred on August 4, 1961, is 100 degrees.

Growing degree days, shown in table 1, are equivalent to heat units. During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, 11 inches, or 35 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 9 inches. The heaviest 1-day rainfall during the period of record was 2.39 inches at Sandpoint on January 22, 1954. Thunderstorms occur on about 15 days each year, and most occur in summer.

Average seasonal snowfall is 88 inches. The greatest snow depth at any one time during the period of record was 46 inches. On the average, 48 days have at least 1 inch of snow on the ground, but the number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 50 percent. Humidity is higher at night, and the average at dawn is about 75 percent. The sun shines 75 percent of the time possible in summer and 30 percent in winter. The prevailing wind is from the south-southwest. Average windspeed is highest, 10 miles per hour, in spring.

how this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map units" and "Detailed soil map units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, rangeland and woodland managers, engineers, planners, developers and builders, home buyers, and others.

general soil map units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The general soil map at the back of this survey does not join, in all instances, with the general soil maps of adjacent survey areas. Differences in the maps have resulted from differences in the occurrence of soil patterns and from recent advances in classification.

The 12 map units in this survey have been grouped into five general kinds of landscape for broad interpretive purposes. Each of the broad groups and the map units in each group are described in the following pages.

map unit descriptions

moderately steep to very steep, well drained soils on mountains

This group consists of five map units. It makes up about 38 percent of the survey area. The soils in this group are mainly in the mountainous areas throughout the survey area. The vegetation is mainly coniferous forest. Elevation is 2,200 to 7,200 feet. The average annual precipitation is 25 to 55 inches, the average annual air temperature is 39 to 48 degrees F, and the average frost-free season is 30 to 120 days.

The soils in this group are moderately deep to very deep and are well drained. They formed in material derived dominantly from granite, gneiss, and schist and have a mantle of volcanic ash and loess.

Most areas of this group are used for timber production, wildlife habitat, recreation, and watershed. A few areas are used for limited livestock grazing.

1. Rock outcrop-Prouty-Jeru

Rock outcrop and moderately deep and very deep, steep and very steep, moderately permeable soils; on mountains at high elevations

This map unit is in the northern part of the survey area. The unit is characterized by deeply dissected drainageways, small streams, and large areas of exposed bedrock and talus. Slopes are 35 to 65 percent. Elevation ranges from 4,800 to 7,200 feet. The average annual precipitation is 45 to 55 inches, the average annual air temperature is 39 to 42 degrees F, and the average frost-free season is 30 to 60 days.

This unit makes up about 15 percent of the survey area. It is about 35 percent Rock outcrop, 30 percent Prouty soils, and 10 percent Jeru soils. The remaining 25 percent is components of minor extent.

Rock outcrop consists of areas of exposed granite, gneiss, and schist on ridgetops of mountains. It is fractured in places and has some soil material in the crevices. Rock outcrop also consists of areas of large stones and boulders deposited on mountainsides by glaciers. It supports little if any vegetation.

Prouty soils are on ridges and convex side slopes of mountains. These soils are moderately deep and well drained. They formed in material derived dominantly from granite, gneiss, and schist and have a mantle of volcanic ash and loess. The surface layer is gravelly loam, and the subsoil is extremely stony sandy loam. Weathered granite is at a depth of 20 to 40 inches.

Jeru soils are on mountainsides. These soils are very deep and well drained. They formed in colluvium and glacial till derived dominantly from granite, gneiss, and schist. The surface layer is very stony loam. Below this to a depth of 60 inches or more are gravelly, very cobbly, and very stony loam and sandy loam.

Of minor extent in this unit are the moderately deep Brickel soils and the deep and very deep Hun and Vay, cool, soils.

Areas of this unit that are dominated by exposed rock and boulders are poorly suited to most uses. This unit is used mainly for timber production, recreation, wildlife habitat, and watershed. A few areas are used for limited livestock grazing.

The main limitations of this unit for producing and harvesting timber are slope, a hazard of water erosion, the areas of Rock outcrop, and the very stony surface in some areas. If this unit is used for livestock grazing, the main limitations are the areas of Rock outcrop, slope, and poor accessibility.

This unit is poorly suited to roads, dwellings, and recreational development because of slope, a hazard of water erosion, poor accessibility, and the areas of Rock outcrop. The potential for the development of woodland wildlife habitat is good.

2. Vay-Ardtoo-Lenz

Moderately deep to very deep, moderately steep to very steep, moderately permeable and moderately rapidly permeable soils; on mountains

This map unit is throughout the survey area. It is mainly on side slopes and ridges (fig. 1). The unit is characterized by deeply dissected drainageways, small streams, and some areas of exposed bedrock. Slopes are 20 to 65 percent. Elevation ranges from 2,300 to 5,200 feet. The average annual precipitation is 25 to 40 inches, the average annual air temperature is 40 to 48 degrees F, and the average frost-free season is 60 to 120 days.

This unit makes up about 13 percent of the survey area. It is about 35 percent Vay soils, 30 percent Ardtoo soils, and 10 percent Lenz soils. The remaining 25 percent is components of minor extent.

Vay soils are on the colder and more moist, north-facing side slopes and in ravines. These soils are moderately permeable, deep and very deep, and well drained. They formed in material derived dominantly from granite, gneiss, and schist and have a thick mantle of volcanic ash. The surface layer is silt loam and gravelly silt loam, and the subsoil is very gravelly loam and extremely gravelly coarse sandy loam. Weathered granite is at a depth of 40 to 60 inches or more.

Ardtoo soils are on south-facing side slopes. These soils are moderately rapidly permeable, deep and very deep, and well drained. They formed in material derived dominantly from granite, gneiss, and schist and have a mantle of loess and volcanic ash. The surface layer is gravelly loam or gravelly sandy loam, and the subsoil is very gravelly coarse sandy loam. Weathered gneiss is at a depth of 40 to 60 inches or more.

Lenz soils are on south-facing, convex side slopes and ridges. These soils are moderately rapidly permeable, moderately deep, and well drained. They formed in

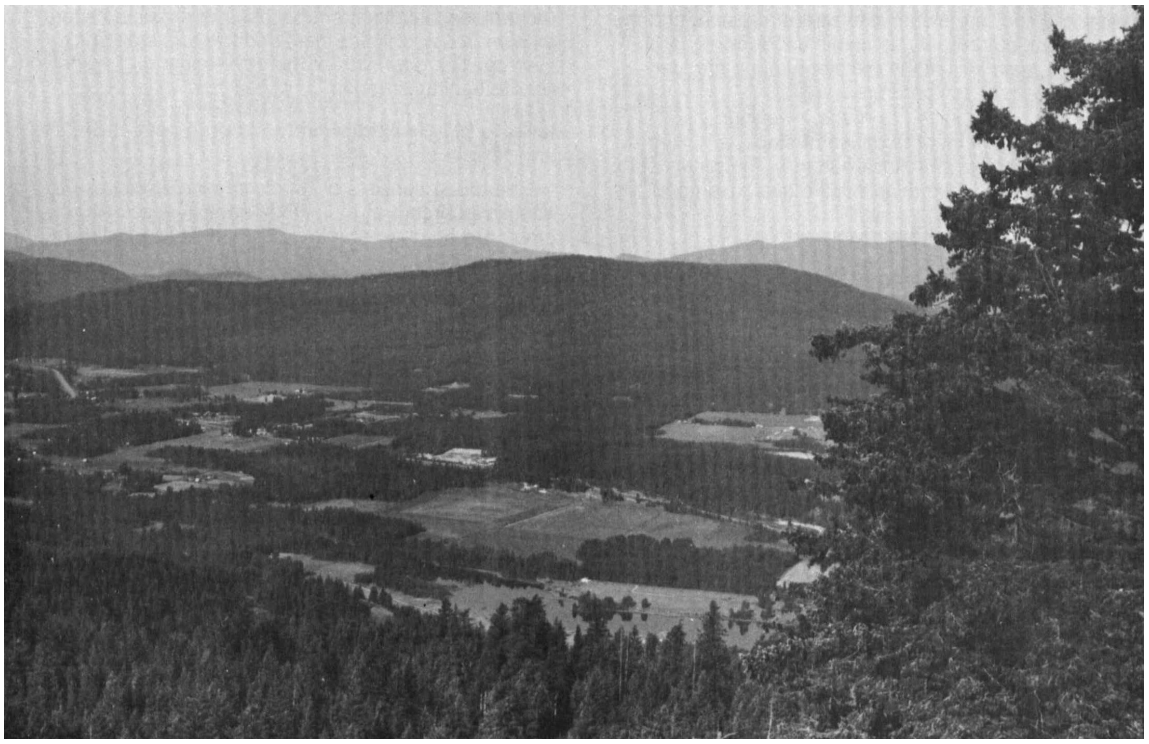


Figure 1.—Area of general map unit 2.

material derived dominantly from granite, gneiss, and schist and have a small amount of loess in the upper part. The surface layer is stony sandy loam, and the subsoil is very gravelly or very cobbly sandy loam. Hard, fractured granite is at a depth of 20 to 40 inches.

Of minor extent are the deep and very deep Melder soils, the very deep Pend Oreille and Treble soils, and Rock outcrop on ridges and convex side slopes.

Most areas of this unit are used for timber production, wildlife habitat, recreation, and watershed. A few areas are used for livestock grazing.

The main limitations for producing and harvesting timber are slope, a hazard of erosion, and Rock outcrop. If this unit is used for livestock grazing, the main limitations are slope and poor accessibility.

This unit is poorly suited to roads, dwellings, and recreational development because of slope, a hazard of erosion, and the areas of Rock outcrop. The potential for the development of woodland wildlife habitat is good.

3. Hun-Jeru

Deep and very deep, rolling to very steep, moderately rapidly permeable soils; on mountains

This map unit is in the northern and northwestern parts of the survey area. It is characterized by deeply dissected drainageways, small streams, and areas of stones and boulders deposited on the surface by glaciers. Slopes are 5 to 75 percent. Elevation ranges from 3,600 to 5,400 feet. The average annual precipitation is 35 to 50 inches, the average annual air temperature is 40 to 43 degrees F, and the average frost-free season is 50 to 90 days.

This unit makes up about 7 percent of the survey area. It is about 45 percent Hun soils and 40 percent Jeru, warm, soils. The remaining 15 percent is components of minor extent.

Hun soils are on the very steep upper slopes of mountains. These soils are deep and very deep and are well drained. They formed in material derived dominantly from granite, gneiss, and schist and have a mantle of volcanic ash and loess. The surface layer is gravelly silt loam, the subsoil is very gravelly sandy loam, and the substratum is extremely cobbly loamy sand. Weathered granite is at a depth of 40 to 60 inches or more.

Jeru, warm, soils are on foot slopes and on steep and very steep mountainsides. These soils are very deep and well drained. They formed in colluvium and glacial till derived dominantly from granite, gneiss, and schist. The surface layer is very stony sandy loam. Below this to a depth of 60 inches or more is gravelly, very cobbly, and very stony sandy loam.

Of minor extent in this unit are the moderately deep Prouty soils, the deep and very deep Ardtoo and Vay soils, and the very deep Priestlake and Treble, high precipitation, soils.

Most areas of this unit are used for timber production, wildlife habitat, recreation, and watershed. A few areas are used for limited livestock grazing.

The main limitations of this unit for producing and harvesting timber are slope, a hazard of erosion, and the very stony surface in some areas. If this unit is used for livestock grazing, the main limitations are slope and poor accessibility.

This unit is poorly suited to roads, dwellings, and recreational development because of slope, a hazard of erosion, poor accessibility, and stoniness in some areas. The potential for the development of woodland wildlife habitat is good.

4. Melder-Kruse

Deep and very deep, moderately steep to very steep, moderately slowly permeable soils; on mountains

This map unit is in the southwestern part of the survey area. It is mainly on south-facing mountainsides. The unit is characterized by deeply dissected drainageways, small streams, and some areas of exposed bedrock. Slopes are 15 to 65 percent. Elevation ranges from 2,200 to 4,000 feet. The average annual precipitation is 25 to 35 inches, the average annual air temperature is 43 to 48 degrees F, and the average frost-free season is 90 to 120 days.

This unit makes up about 2 percent of the survey area. It is about 65 percent Melder soils and 20 percent Kruse soils. The remaining 15 percent is components of minor extent.

Melder soils are on south-facing mountainsides. These soils are deep and very deep and are well drained. They formed in material derived dominantly from granite, gneiss, and schist and have a mantle of loess and volcanic ash. The surface layer is loam. The subsoil is gravelly and very gravelly loam or clay loam. Weathered granite is at a depth of 40 to 60 inches or more.

Kruse soils are on the cooler, east- and west-facing mountainsides. These soils are very deep and well drained. They formed in material derived dominantly from gneiss and schist and have a mantle of loess and volcanic ash. The surface layer is silt loam. Below this to a depth of 60 inches or more the soils are silty clay loam, clay loam, and gravelly clay loam.

Of minor extent in this unit are the moderately deep Lenz soils, the deep and very deep Ardtoo and Vay soils, and areas of Rock outcrop on ridges and convex side slopes.

Most areas of this unit are used for timber production, wildlife habitat, recreation, and watershed. A few areas are used for livestock grazing and as homesites.

The main limitations of this unit for producing and harvesting timber and for livestock grazing are slope and a hazard of erosion.

This unit is poorly suited to roads, dwellings, and recreational development because of slope, a hazard of erosion, and the areas of Rock outcrop. The potential for the development of woodland wildlife habitat is good.

5. Vassar-Moscow

Moderately deep to very deep, steep and very steep, moderately permeable soils; on mountains

This map unit is in the southwestern part of the survey area. It is mainly on mountainsides. The unit is characterized by deeply dissected drainageways and small streams. Slopes are 30 to 65 percent. Elevation ranges from 2,600 to 4,000 feet. The average annual precipitation is 30 to 40 inches, the average annual air temperature is 41 to 45 degrees F, and the average frost-free season is 70 to 110 days.

This unit makes up about 1 percent of the survey area. It is about 65 percent Vassar soils and 15 percent Moscow soils. The remaining 20 percent is components of minor extent.

Vassar soils are on north-facing mountainsides and in ravines. These soils are deep and very deep and are well drained. They formed in material derived dominantly from granite, gneiss, and schist and have a thick mantle of volcanic ash. The surface layer is silt loam, and the subsoil is gravelly and cobbly sandy loam. Weathered schist is at a depth of 40 to 60 inches or more.

Moscow soils are in east- and west-facing areas on ridges and convex side slopes. These soils are moderately deep and well drained. They formed in material derived dominantly from granite, gneiss, and schist and have a mantle of volcanic ash and loess. The surface layer is loam, and the subsoil is loam and sandy loam. Weathered schist is at a depth of 20 to 40 inches.

Of minor extent in this unit are the moderately deep Lenz soils, the deep and very deep Ardtoo and Vay soils, and the very deep Kruse soils.

Most areas of this unit are used for timber production, wildlife habitat, watershed, and recreation. A few areas are used for limited livestock grazing.

The main limitations of this unit for producing and harvesting timber are slope and a hazard of erosion. If this unit is used for livestock grazing, the main limitations are slope and poor accessibility.

This unit is poorly suited to roads, dwellings, and recreational development because of slope and a hazard of erosion. The potential for the development of woodland wildlife habitat is good.

rolling to very steep, well drained soils on foothills and mountains

This group consists of two map units. It makes up about 35 percent of the survey area. The soils in this group are on mountains and foothills throughout the survey area. The vegetation is mainly coniferous forest. Elevation is 2,100 to 5,000 feet. The average annual precipitation is 25 to 45 inches, the average annual air temperature is 40 to 46 degrees F, and the average frost-free season is 50 to 120 days.

The soils in this group are very deep and well drained. They formed in glacial till derived dominantly from granite, gneiss, and schist and have a mantle of volcanic ash and loess.

Most areas of this group are used for timber production, wildlife habitat, limited livestock grazing, recreation, and watershed. A few areas are used for hay and pasture and as homesites.

6. Pend Oreille-Rock outcrop-Treble

Very deep, well drained, rolling to very steep soils, and Rock outcrop; on foothills and mountainsides

Areas of this map unit are throughout the survey area. The unit is characterized by dissected drainageways and small streams. Slopes are 5 to 65 percent. Elevation ranges from 2,100 to 3,600 feet. The average annual precipitation is 25 to 38 inches, the average annual air temperature is 42 to 46 degrees F, and the average frost-free season is 70 to 120 days.

This unit makes up about 27 percent of the survey area. It is about 55 percent Pend Oreille soils, 10 percent Rock outcrop, and 10 percent Treble soils. The remaining 25 percent is components of minor extent.

Pend Oreille soils are on the lower and cooler north-facing side slopes of foothills and mountains. These soils are very deep and well drained. They formed in glacial till derived dominantly from granite, gneiss, and schist and have a mantle of volcanic ash and loess. The surface layer and subsoil are silt loam. Below this to a depth of 60 inches or more is gravelly or cobbly sandy loam.

Rock outcrop consists of areas of exposed granite, gneiss, and schist on ridges and convex mountainsides. It is fractured in places and has some soil material in the cracks and crevices.

Treble soils are on the lower and warmer south-facing side slopes of foothills and mountains. These soils are very deep and well drained. They formed in glacial till derived dominantly from granite, gneiss, and schist and have a thin mantle of loess and volcanic ash. The surface layer is gravelly sandy loam, and the subsoil is very gravelly sandy loam. Below this to a depth of 60 inches or more is very gravelly or very cobbly loamy coarse sand.

Of minor extent in this unit are the poorly drained Hoodoo soils, the somewhat poorly drained Sagle soils, the moderately deep Lenz soils, the deep and very deep Ardtoo and Vay soils, and the very deep Bonner, Dufort, and Rathdrum soils.

Most areas of this unit are used for timber production, livestock grazing, wildlife habitat, recreation, and watershed. A few areas are used for hay and pasture and as homesites.

The main limitations of this unit for producing and harvesting timber are slope, a hazard of erosion, and the areas of Rock outcrop. If this unit is used for hay and pasture, the main limitations are slope in the steeper areas and cool soil temperatures.

This unit is poorly suited to roads, dwellings, and recreational development because of slope, a hazard of erosion, and the areas of Rock outcrop. The potential for the development of woodland wildlife habitat is good.

7. Priestlake-Treble, high precipitation

Very deep, well drained, moderately steep to very steep soils; on foothills and mountainsides

This map unit is in the northern part of the survey area. It is characterized by deeply dissected drainageways, small streams, and some areas of Rock outcrop. Slopes are 15 to 65 percent. Elevation ranges from 2,400 to 5,000 feet. The average annual precipitation is 35 to 45 inches, the average annual air temperature is 40 to 44 degrees F, and the average frost-free season is 50 to 90 days.

This unit makes up about 8 percent of the survey area. It is about 55 percent Priestlake soils and 20 percent Treble, high precipitation, soils. The remaining 25 percent is components of minor extent.

Priestlake soils are on the cooler, north-facing mountainsides. These soils are very deep and well drained. They formed in glacial till derived dominantly from granite, gneiss, and schist and have a mantle of loess and volcanic ash. The surface layer is gravelly sandy loam, and the subsoil is very gravelly sandy loam. Below this to a depth of 60 inches or more is very gravelly or extremely cobbly loamy sand or sand.

Treble, high precipitation, soils are at the lower elevations on foothills and the warmer, south-facing mountainsides. These soils are very deep and well drained. They formed in glacial till derived dominantly from granite, gneiss, and schist and have a thin mantle of loess and volcanic ash. The surface layer is gravelly sandy loam, and the subsoil is very gravelly sandy loam. Below this to a depth of 60 inches or more is very gravelly or very cobbly loamy coarse sand.

Of minor extent in this unit are the moderately deep Klootch soils, the deep and very deep Hun soils, the very deep Pend Oreille and Jeru, warm, soils, and areas of Rock outcrop on ridges and convex side slopes.

Most areas of this unit are used for timber production, wildlife habitat, recreation, and watershed. A few areas are used for limited livestock grazing and as sites for homes and summer cabins.

The main limitations of this unit for producing and harvesting timber are slope, a hazard of erosion, and the areas of Rock outcrop. If this unit is used for livestock grazing, the main limitations are slope and poor accessibility.

This unit is poorly suited to roads, dwellings, and recreational development because of slope, a hazard of erosion, a risk of landslides, and the areas of Rock outcrop. The potential for the development of woodland wildlife habitat is good.

level to hilly, well drained soils on glacial moraines and terraces

This group consists of two map units. It makes up about 15 percent of the survey area. The soils in this group are on outwash plains and terraces in valleys throughout the survey area. The vegetation is mainly coniferous forest. Elevation is 2,050 to 3,000 feet. The average annual precipitation is 25 to 38 inches, the average annual air temperature is 42 to 46 degrees F, and the average frost-free season is 80 to 120 days.

The soils in this group are very deep and well drained. They formed in glacial till and outwash derived dominantly from granite, gneiss, and schist and have a mantle of volcanic ash and loess.

Most areas of this group are used for timber production, hay and pasture, livestock grazing, wildlife habitat, recreation, and homesite development. A few areas are used for irrigated or nonirrigated crop production.

8. Bonner-Kootenai

Very deep, well drained, level to hilly soils; on terraces

This map unit is in the southern and central parts of the survey area. It is mainly on moraines and terraces (fig. 2). The unit is characterized by broad, level to hilly terraces that are dissected by steep escarpments. Slopes are 0 to 20 percent. Elevation ranges from 2,050 to 2,600 feet. The average annual precipitation is 25 to 35 inches, the average annual air temperature is 43 to 46 degrees F, and the average frost-free season is 90 to 120 days.

This unit makes up about 10 percent of the survey area. It is about 45 percent Bonner soils and 35 percent Kootenai soils. The remaining 20 percent is components of minor extent.

Bonner soils are on the lower terraces and in depressional areas. These soils are very deep and well drained. They formed in glacial outwash derived dominantly from granite, gneiss, and schist and have a mantle of volcanic ash and loess. The surface layer is gravelly silt loam, and the subsoil is gravelly silt loam and gravelly sandy loam. Below this to a depth of 60 inches or more is very gravelly loamy sand.

Kootenai soils are on moraines on the higher terraces. These soils are very deep and well drained. They formed in glacial till and outwash derived dominantly from granite, gneiss, and schist and have a mantle of loess and volcanic ash. The surface layer is gravelly silt loam. The subsoil is gravelly silt loam in the upper part and very gravelly sandy loam in the lower part. Below this to

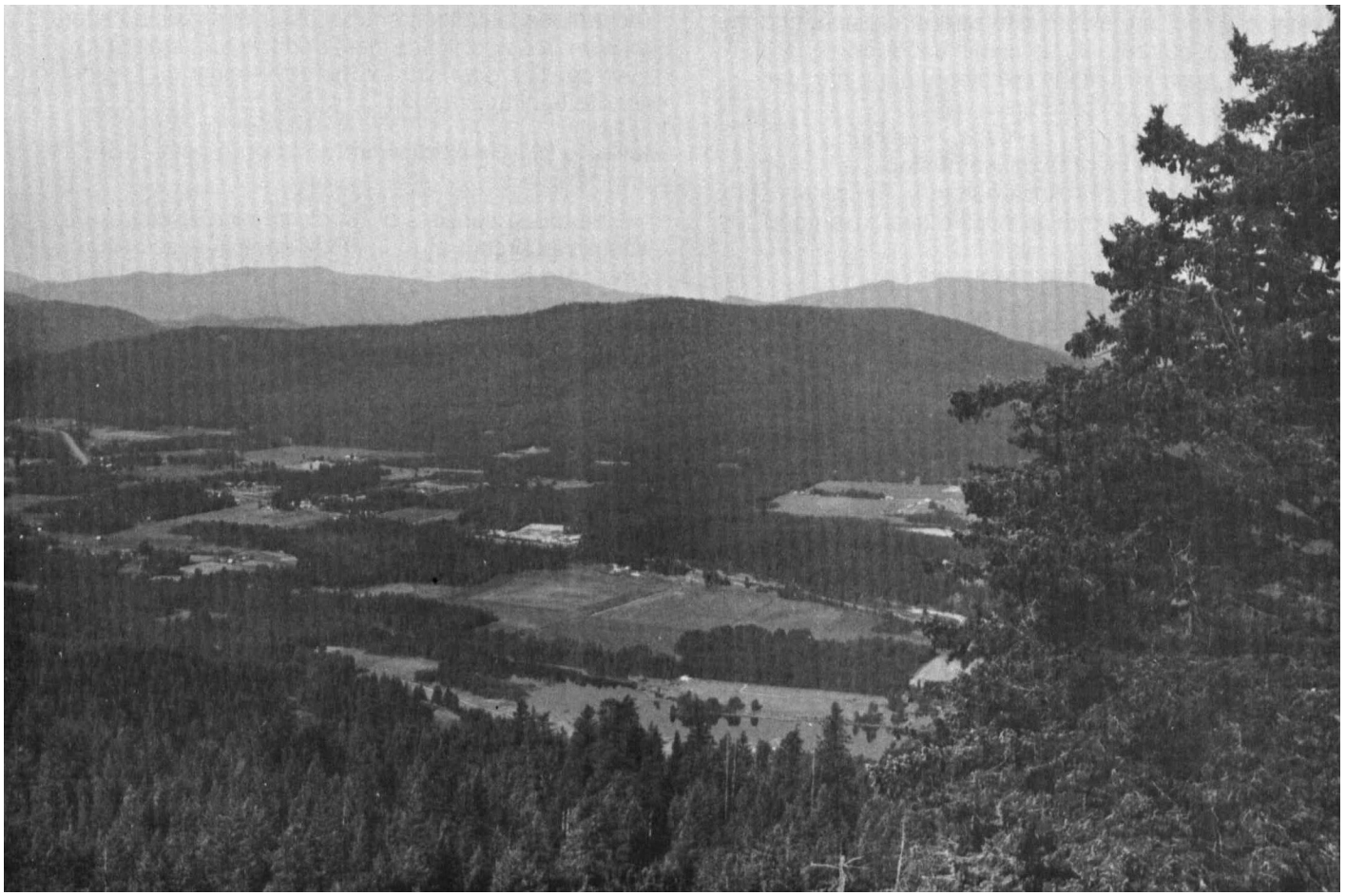


Figure 2.—Area of general map unit 8. Bonner and Kootenai soils on glacial outwash terraces in center.

a depth of 60 inches or more is extremely gravelly loamy coarse sand.

Of minor extent in this unit are the excessively drained Elmira soils; the well drained Kaniksu, Rathdrum, and Selle soils; and Bonner and Kootenai soils on steep terrace escarpments.

This unit is used mainly for timber production, livestock grazing, wildlife habitat, and recreation. It is also used for irrigated or nonirrigated crop production, hay and pasture, and homesites.

The main limitation of this unit for harvesting timber is the susceptibility of the soils to compaction and rutting when they are moist. If the unit is used for crop production, the main limitations are low available water capacity and cool soil temperatures.

This unit is marginally suited to roads and dwellings because of a hazard of frost heaving and a risk of seepage from septic tank absorption fields contaminating ground water. The unit is well suited to recreational development. It has few limitations. The potential for the development of woodland wildlife habitat is good.

9. Bonner

Very deep, level to undulating, well drained soils; on terraces

This map unit is in the northwestern and eastern parts of the survey area. It is mainly on glacial outwash terraces. The unit is dissected by small streams and rivers. Slopes are 0 to 4 percent. Elevation ranges from 2,060 to 3,000 feet. The average annual precipitation is 30 to 38 inches, the average annual air temperature is 42 to 44 degrees F, and the average frost-free season is 80 to 100 days.

This unit makes up about 5 percent of the survey area. It is about 75 percent Bonner, cool, soils and 25 percent components of minor extent.

Bonner, cool, soils are very deep and well drained. They formed in glacial outwash derived dominantly from granite, gneiss, and schist and have a mantle of volcanic ash and loess. The surface layer is silt loam. The subsoil is gravelly silt loam or gravelly sandy loam. Below this to a depth of 60 inches or more is very gravelly loamy sand or very gravelly coarse sand.

Of minor extent in this unit are the poorly drained Capehorn soils, the somewhat poorly drained Colburn soils, and the well drained Rathdrum, cool, and Selle soils.

Most areas of this unit are used for timber production, wildlife habitat, and recreation and as sites for homes and summer cabins. A few areas are used for hay and pasture.

This unit is poorly suited to crop production because of cool soil temperatures and a short growing season. The unit is well suited to timber production and recreational development. The main limitation for harvesting timber is the susceptibility of the soils to compaction and rutting when they are wet. If this unit is used for hay and pasture, the main limitations are cool soil temperatures and a short growing season.

This unit is marginally suited to roads and dwellings because of a hazard of frost heaving and a risk of seepage from septic tank absorption fields contaminating ground water. The potential for the development of woodland wildlife habitat is good.

level to hilly, poorly drained to excessively drained soils on alluvial fans, terraces, and dunes

This group consists of two map units. It makes up about 9 percent of the survey area. The soils in this group are mainly in the valleys of the north-central and southeastern parts of the survey area. The vegetation is mainly coniferous forest. Elevation is 2,050 to 2,800 feet. The average annual precipitation is 28 to 38 inches, the average annual air temperature is 42 to 46 degrees F, and the average frost-free season is 90 to 120 days.

The soils in this group are very deep and poorly drained to excessively drained. They formed in alluvium and in glacial lake-laid sediment derived from mixed sources.

Most areas of this group are used for hay and pasture, livestock grazing, irrigated and nonirrigated crop production, and homesite development. A few areas are used for timber production, wildlife habitat, and recreation.

10. Colburn-Selle-Elmira

Very deep, level to hilly, somewhat poorly drained to excessively drained soils; on alluvial fans, terraces, and dunes

This map unit is in the north-central part of the survey area. It is mainly on alluvial fans and terraces adjacent to flood plains and on dunes. The unit is characterized by broad areas that are dissected by small drainageways. Slopes are 0 to 20 percent. Elevation ranges from 2,050 to 2,600 feet. The average annual precipitation is 28 to 35 inches, the average annual air temperature is 42 to 46 degrees F, and the average frost-free season is 90 to 120 days.

This unit makes up about 2 percent of the survey area. It is about 40 percent Colburn soils, 30 percent Selle soils, and 15 percent Elmira soils. The remaining 15 percent is components of minor extent.

Colburn soils are in the lower areas on alluvial fans and terraces. These soils are very deep and somewhat poorly drained. They formed in alluvium. The surface layer and subsoil are very fine sandy loam. Below this to a depth of 60 inches or more are fine sandy loam, loamy fine sand, and fine sand.

Selle soils are in intermediate areas on terraces and dunes. These soils are very deep and well drained. They formed in sandy glacial lake-laid sediment that has been reworked by wind and have a thin mantle of loess and volcanic ash. The surface layer and subsoil are fine sandy loam. Below this to a depth of 60 inches or more is loamy fine sand or fine sand.

Elmira soils are in the higher areas on dunes. These soils are very deep and excessively drained. They formed in sandy glacial lake-laid sediment that has been reworked by wind. The surface layer and subsoil are loamy sand. Below this to a depth of 60 inches or more is sand.

Of minor extent in this unit are the very poorly drained Pywell soils, the poorly drained Hoodoo and Odenson soils, the somewhat poorly drained Mission soils, and the well drained Bonner soils.

This unit is used mainly for hay and pasture, timber production, livestock grazing, and wildlife habitat. It is also used for irrigated and nonirrigated crops, recreation, and homesites.

If this unit is used for crops, the main limitations are the seasonal high water table and cool temperatures of the Colburn soils and the droughtiness of the Selle and Elmira soils. The main limitations of this unit for producing and harvesting timber are the seasonal wetness of the Colburn soils and the sandy texture and droughtiness of the Elmira soils. The Selle soils are well suited to timber production.

This unit is marginally suited to roads and dwellings because of the seasonal high water table and the hazard of frost heaving of the Colburn soils and because of a risk of seepage from septic tank absorption fields contaminating ground water. The potential for the development of woodland wildlife habitat and recreation areas is good.

11. Mission-Cabinet-Odenson

Very deep, level to moderately steep, poorly drained to moderately well drained soils; on terraces

This map unit is in the central and southeastern parts of the survey area. It is mainly on glacial lake terraces. The unit is characterized by broad areas that are dissected by small drainageways and terrace escarpments. Slopes are 0 to 30 percent. Elevation ranges from 2,050 to 2,800 feet. The average annual precipitation is 28 to 38 inches, the average annual air temperature is 42 to 45 degrees F, and the average frost-free season is 90 to 120 days.

This unit makes up about 7 percent of the survey area. It is about 60 percent Mission soils, 10 percent Cabinet soils, and 10 percent Odenson soils. The remaining 20 percent is components of minor extent.

Mission soils are in the higher areas on terraces. These soils are shallow to a hardpan and are somewhat poorly drained. They formed in silty glacial lake-laid sediment derived from mixed sources and have a mantle of volcanic ash and loess. The surface layer is silt loam. The subsoil is dense and brittle silt loam and silty clay loam. Below this to a depth of 60 inches or more is stratified fine sand to silty clay.

Cabinet soils are on the higher terraces and terrace side slopes, mainly in the Cabinet Gorge area. These soils are very deep and moderately well drained. They formed in glacial lake-laid sediment derived from mixed sources and have a mantle of volcanic ash and loess. The surface layer is silt loam. The subsoil is clay. Below this to a depth of 60 inches or more is stratified very fine sandy loam to clay.

Odenson soils are in the lower, wetter areas on terraces. These soils are very deep and poorly drained. They formed in silty glacial lake-laid sediment derived from mixed sources and have a mantle of loess and volcanic ash. The surface layer is silt loam, and the subsoil is silty clay loam. Below this to a depth of 60 inches or more is stratified very fine sandy loam to silty clay.

Of minor extent in this unit are the very poorly drained Wrencoe and Pywell soils, the poorly drained Hoodoo soils, the somewhat poorly drained Colburn soils, and the well drained Bonner, Selle, and Pend Oreille soils.

This unit is used mainly for crop production, hay and pasture, and homesites. It is also used for timber production, livestock grazing, wildlife habitat, and recreation.

The main limitations of this unit for crop production and for hay and pasture are depth to the hardpan or clay layer, seasonal wetness, very slow permeability, restricted rooting depth, and cool soil temperatures in some areas. If this unit is used for timber production, the main limitations are seasonal wetness and susceptibility of the soils to compaction and rutting.

This unit is poorly suited to roads, dwellings, and recreational development because of a seasonal perched water table, very slow permeability, and a hazard of frost heaving. The potential for the development of woodland and wetland wildlife habitat is good.

level to nearly level, poorly drained to very poorly drained soils on low stream terraces, flood plains, and bottom lands

The group has only one map unit. It makes up about 3 percent of the survey area. The soils in this unit are in wet depressions on bottom lands and flood plains throughout the survey area. The vegetation is mainly grasses, sedges, rushes, cattails, and shrubs. The elevation is 2,050 to 3,000 feet. The average annual precipitation is 25 to 35 inches, the average annual air temperature is 42 to 45 degrees F, and the average frost-free season is 80 to 110 days.

The soils in this group are very deep and poorly to very poorly drained. They formed in alluvium and lake-laid sediment derived from mixed sources and in organic material derived from herbaceous plants.

Most areas are used for hay and pasture, livestock grazing, and wildlife habitat. A few areas that are adequately drained and protected from flooding are used for crop production.

12. Hoodoo-Pywell-Wrencoe

Very deep, level and nearly level, poorly drained and very poorly drained soils; on low stream terraces, flood plains, and bottom lands

Areas of this map unit are throughout the survey area. They are mainly on flood plains adjacent to streams, rivers, and lakes. This unit is characterized by wet depressional areas and drainageways. Slopes are 0 to 2 percent. Elevation ranges from 2,050 to 3,000 feet. The average annual precipitation is 25 to 35 inches, the average annual air temperature is 42 to 45 degrees F, and the average frost-free season is 80 to 110 days.

This unit makes up about 3 percent of the survey area. It is about 40 percent Hoodoo soils, 20 percent Pywell soils, and 10 percent Wrencoe soils. The remaining 30 percent is components of minor extent.

Hoodoo soils are in drainageways and on bottom lands. These soils are very deep and poorly drained. They formed in alluvium derived dominantly from volcanic ash. The surface layer is silt loam. Below this to a depth of 60 inches or more is stratified very fine sandy loam to silty clay loam that commonly is very gravelly or cobbly in the lower part.

Pywell soils are on bottom lands, in drainageways, and on flood plains. These soils are very deep and very poorly drained. They formed in organic material derived dominantly from herbaceous plants. The soils are organic material throughout.

Wrencoe soils are on low stream terraces and bottom lands adjacent to streams and rivers. These soils are very deep and very poorly drained. They formed in lake-laid sediment derived from mixed sources. The surface layer and subsoil are silty clay. Below this to a depth of 60 inches or more is silty clay or silty clay loam that is gravelly in the lower part in some areas.

Of minor extent in this unit are the poorly drained Capehorn soils, the somewhat poorly drained Colburn soils, and the well drained Bonner and Rathdrum soils.

This unit, in areas that are adequately drained and protected from flooding, is used for crop production. It is also used for hay and pasture, livestock grazing, and wildlife habitat.

If this unit is used for crop production, the main limitations are a seasonal high water table, a hazard of flooding, cool soil temperatures, and a short growing season. The main limitations of this unit for hay and pasture are seasonal wetness and cool soil temperatures.

This unit is poorly suited to dwellings, roads, and recreational development because of a seasonal high water table, a hazard of flooding, a hazard of frost heaving, and excess humus. The potential for the development of wetland wildlife habitat is good.

detailed soil map units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and management of the soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Mission silt loam, 2 to 12 percent slopes, is one of several phases in the Mission series.

Some map units are made up of two or more major soils. These map units are called soil complexes, soil associations, or undifferentiated groups.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Pywell-Hoodoo complex, 0 to 1 percent slopes, is an example.

A *soil association* is made up of two or more geographically associated soils that are shown as one unit on the maps. Because of present or anticipated soil uses in the survey area, it was not considered practical or necessary to map the soils separately. The pattern and relative proportion of the soils are somewhat similar. Vay-Ardtoo association, 20 to 35 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Haploxeralfs and Xerochrepts, 30 to 55 percent slopes, is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

This survey was mapped at two levels of intensity, or detail. The more detailed part is identified by narrowly defined units, and the less detailed part is identified by broadly defined units. In the narrowly defined units the soil delineation boundaries were plotted and verified at closely spaced intervals. In the broadly defined units the soil delineation boundaries were plotted and verified by some observations. The intensity of mapping was based on the anticipated long-term use of the survey, and the map units were designed to meet the needs for that use. On the soil map legend at the back of this survey, the broadly defined units are identified by an asterisk following the map unit name.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

map unit descriptions

1—Ardtoo gravelly sandy loam, 35 to 65 percent slopes. This deep, well drained soil is on south-facing mountainsides. It formed in material derived dominantly from granite, gneiss, schist and has a mantle of loess and volcanic ash. Elevation is 2,300 to 5,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 100 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1.5 inches thick. The surface layer is dark gray and pale brown, slightly acid gravelly sandy loam about 6 inches thick. The upper 6 inches of the subsoil is light yellowish brown, slightly acid gravelly sandy loam, and the lower 33 inches is very pale brown, slightly acid and medium acid very gravelly coarse sandy loam. Weathered gneiss is at a depth of about 45 inches.

Permeability of this Ardtoo soil is moderately rapid. Effective rooting depth is 40 to 60 inches or more. Available water capacity is low. Runoff is very rapid, and the hazard of water erosion is very high.

Included in this unit are small areas of Vay silt loam on north-facing side slopes, Melder loam on south-facing side slopes, Lenz stony sandy loam in south-facing areas on ridges, and Kruse silt loam on east- and west-facing side slopes.

This unit is used for timber production, limited livestock grazing, recreation, wildlife habitat, and watershed.

Woodland.—Grand fir, Douglas-fir, ponderosa pine, and western larch are the main woodland species on this unit. On the basis of a 50-year site curve, the average site index for grand fir is 70. On the basis of a 100-year site curve, the average site index is 110 for Douglas-fir and 105 for ponderosa pine. Yield tables indicate that the maximum average annual growth is 135 cubic feet per acre of grand fir at 105 years of age, 122 cubic feet per acre of Douglas-fir at 40 years of age, and 112 cubic feet per acre of ponderosa pine at 40 years of age.

The main limitations for the harvesting of timber are slope and the hazard of water erosion. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished.

If seed trees are present, natural regeneration of cutover areas by Douglas-fir and ponderosa pine occurs readily.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 20 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,800 pounds of air-dry vegetation per acre to less than 200 pounds per acre as the canopy closes. If the shrubs on this unit are managed to create open areas, the unit produces a good stand of desirable grasses and forbs. Slope may create livestock distribution problems.

Recreation.—This unit is poorly suited to recreational development. It is limited mainly by slope. Steepness of slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. The main limitation is slope.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

This map unit is in capability subclass VIIe and in woodland suitability subclass 1f.

2—Bonner gravelly silt loam, 0 to 4 percent slopes. This very deep, well drained, level to undulating soil is on terraces. It formed in glacial outwash derived dominantly from granite, gneiss, and schist and has a mantle of volcanic ash and loess. The average annual precipitation is about 30 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 100 days.

Typically, the surface is covered with a mat of needles and twigs about 1.3 inches thick. The surface layer is pale brown, slightly acid gravelly silt loam about 5 inches thick. The subsoil is pale brown and very pale brown, slightly acid gravelly silt loam and gravelly sandy loam about 24 inches thick. The substratum to a depth of 60 inches or more is very pale brown, slightly acid and neutral very gravelly loamy sand.

Permeability of this Bonner soil is moderate to a depth of about 29 inches and rapid to very rapid below this depth. Effective rooting depth is limited to a depth of 20 to 40 inches by sand and gravel. Available water capacity is low. Runoff is slow, and the hazard of water erosion is slight.

Included in this unit are small areas of Rathdrum silt loam in swales and depressional areas, Kootenai gravelly silt loam on the higher knolls and ridges, Kaniksu sandy loam in the higher areas, and a soil that is similar to this Bonner soil but is gravelly silty clay loam in the lower part of the subsoil and is in swales and depressional areas.

This unit is used mainly for timber production, cultivated crops, and hay and pasture (fig. 3). It is also used for livestock grazing, wildlife habitat, recreation, and homesite development.

Cropland.—This unit is well suited to irrigated crops but is marginally suited to nonirrigated crops. It is limited mainly by low available water capacity and cool soil temperatures.

Figure 3.—Typical area of Bonner gravelly silt loam, 0 to 4 percent slopes, used for hay and pasture.

Hay and pasture.—This unit is suited to hay and pasture. If a high level of management is used, yields are good in irrigated areas and fair to poor in nonirrigated areas. Among the adapted improved forage plants are orchardgrass, smooth brome, and tall fescue.

Woodland.—Grand fir, Douglas-fir, ponderosa pine, western larch, and lodgepole pine are the main woodland species on this unit. On the basis of a 50-year site curve, the average site index for grand fir is 60. On the basis of a 100-year site curve, the average site index for Douglas-fir is 110. Yield tables indicate that the maximum average annual growth is 118 cubic feet per acre of grand fir at 105 years of age and 122 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are the high content of volcanic ash and susceptibility of the soil to compaction. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,800 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes.

Recreation.—This unit is suited to recreational development. It is limited mainly by dustiness and the gravelly surface layer. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover. Plant cover can be maintained by limiting traffic.

Homesite development.—This unit is suited to homesite development. The main limitations are a risk of seepage from septic tank absorption fields, resulting in

contamination of ground water, and a hazard of frost heaving. Specially designed waste disposal systems are needed. Roads and buildings should be designed to offset the effects of frost heaving. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

This map unit is in capability subclasses IIIs, irrigated, and IVs, nonirrigated. It is in woodland suitability subclass 2o.

3—Bonner gravelly silt loam, 30 to 65 percent slopes. This very deep, well drained soil is on terraces and terrace escarpments. It formed in glacial outwash derived dominantly from granite, gneiss, and schist and has a mantle of volcanic ash and loess. Elevation is 2,050 to 2,500 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 100 days.

Typically, the surface is covered with a mat of needles and twigs about 1.3 inches thick. The surface layer is pale brown, slightly acid gravelly silt loam about 5 inches thick. The subsoil is pale brown and very pale brown, slightly acid gravelly silt loam and gravelly sandy loam about 24 inches thick. The substratum to a depth of 60 inches or more is very pale brown, slightly acid and neutral very gravelly loamy sand.

Permeability of this Bonner soil is moderate to a depth of about 29 inches and very rapid below this depth. Effective rooting depth is limited to a depth of 24 to 36 inches by sand and gravel. Available water capacity is low. Runoff is rapid to very rapid, and the hazard of water erosion is very high.

Included in this unit are small areas of Kootenai gravelly silt loam, Pend Oreille silt loam, Dufort silt loam, and Treble gravelly sandy loam.

This unit is used for timber production, limited livestock grazing, and wildlife habitat.

Woodland.—Grand fir, Douglas-fir, ponderosa pine, western larch, and lodgepole pine are the main woodland species on this unit. On the basis of a 50-year site curve, the average site index for grand fir is 60. On the basis of a 100-year site curve, the average site index for Douglas-fir is 110. Yield tables indicate that the maximum average annual growth is 118 cubic feet per acre of grand fir at 105 years of age and 122 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are slope and the hazard of water erosion. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. If roads are constructed on this unit, slumping of cutbanks can be expected.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,800 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes. Slope may create livestock distribution problems.

Recreation.—This unit is poorly suited to recreational development. The main limitations are slope and the hazard of water erosion. Steepness of slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. The main limitation is slope.

This map unit is in capability subclass VIIe and in woodland suitability subclass 2r.

4—Bonner silt loam, cool, 0 to 4 percent slopes. This very deep, well drained soil is on terraces. It formed in glacial outwash material derived dominantly from granite, gneiss, and schist and has a mantle of volcanic ash and loess. Elevation is 2,060 to 3,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is about 90 days.

Typically, the surface is covered with a mat of needles and twigs about 1.3 inches thick. The surface layer is pale brown, slightly acid silt loam about 5 inches thick. The subsoil is pale brown and very pale brown, slightly acid gravelly silt loam and gravelly sandy loam about 24 inches thick. The substratum to a depth of 60 inches or more is very pale brown, slightly acid and neutral very gravelly loamy sand.

Permeability of this Bonner soil is moderate to a depth of about 29 inches and rapid to very rapid below this depth. Effective rooting depth is limited to to a depth of 24 to 36 inches by sand and gravel. Available water capacity is low. Runoff is slow, and the hazard of water erosion is slight.

Included in this unit are small areas of Rathdrum silt loam, cool, in swales and low-lying areas; Selle fine sandy loam in high-lying areas; Colburn very fine sandy loam in low-lying areas; and Capehorn silt loam on wet bottom lands along creeks.

This unit is used for timber production, wildlife habitat, recreation, homesites, and summer cabins. A few areas are used for hay and pasture and livestock grazing.

Cropland.—This unit is poorly suited to cultivated crops. It is limited mainly by cool soil temperatures and a short growing season.

Hay and pasture.—This unit is suited to hay and pasture. The main limitations are cool soil temperatures and a short growing season. Among the adapted improved forage plants are intermediate wheatgrass, smooth brome, tall fescue, orchardgrass, and alsike clover.

Woodland.—Western hemlock, western redcedar, grand fir, and western white pine are the main woodland species on this unit. Among the trees of limited extent are western larch and Douglas-fir. On the basis of a 50-year site curve, the average site index is 90 for grand fir and 85 for western white pine. On the basis of a 100-year site curve, the average site index is 125 for Douglas-fir. Yield tables indicate that the maximum average annual growth is 173 cubic feet per acre of grand fir at 100 years of age, 163 cubic feet per acre of western white pine at 100 years of age, and 154 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitation for the harvesting of timber is the susceptibility of the soil to compaction. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction. Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,200 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes.

Recreation.—This unit is suited to recreational development. It is limited mainly by dustiness. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover. Plant cover can be maintained by limiting traffic.

Homesite development.—This unit is suited to homesite development. The main limitations are the risk of seepage from septic tank absorption fields and a hazard of frost heaving. Specially designed waste disposal systems are needed. Roads and buildings should be designed to offset the effects of frost heaving.

This map unit is in capability subclass IVs and in woodland suitability subclass 1o.

5—Brickel-Rubble land association, 5 to 45 percent slopes. This map unit is in rolling to steep areas on mountainsides and ridgetops. Elevation is 5,000 to 6,500 feet.

This unit is about 40 percent Brickel stony loam and 30 percent Rubble land. The remaining 30 percent is included soils.

Included in this unit are small areas of Prouty gravelly loam on steep side slopes, Jeru extremely stony loam, and Vay silt loam, cool, on side slopes.

The Brickel soil is moderately deep and well drained. It formed in material derived dominantly from granite, gneiss, and schist and has a mantle of loess and volcanic ash. The average annual precipitation is about 50 inches, the average annual air temperature is about 40 degrees F, and the average frost-free period is about 45 days.

Typically, the surface is covered with a mat of leaves and twigs about 1 inch thick. The surface layer is dark grayish brown, medium acid stony loam about 7 inches thick. The subsoil is yellowish brown, medium acid very stony loam about 8 inches thick. The substratum is light yellowish brown, medium acid extremely stony sandy loam about 12 inches thick. Fractured granite is at a depth of about 27 inches.

Permeability of this Brickel soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is very low. Runoff is rapid to very rapid, and the hazard of water erosion is high to very high.

Rubble land consists mainly of areas of stones and boulders that support little vegetation except for lichens and a few stunted shrubs or trees growing between the rock fragments. It is commonly below areas of Rock outcrop, but some areas have been deposited on mountainsides by glaciation. Areas of Rubble land are not suitable for most land uses.

This unit is used for recreation, limited livestock grazing, wildlife habitat, and watershed.

Livestock grazing.—This unit is used for only limited livestock grazing because of poor accessibility and low forage production as a result of cold temperatures, a short growing season, large amounts of stones, and the areas of Rubble land. Slope may create livestock distribution problems. The average annual production of air-dry vegetation ranges from 1,200 pounds per acre in favorable years to less than 150 pounds in unfavorable years.

Recreation.—Most areas of this unit are poorly suited to recreational development. The main limitations are slope and the hazard of water erosion. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as recreational sites. Cuts and fills should be seeded or mulched. Plant cover can be maintained by limiting traffic.

Homesite development.—This unit is poorly suited to homesite development. The main limitations are poor accessibility, slope, and depth to bedrock.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

The Brickel soil is in capability subclass VIe, and the Rubble land is in capability subclass VIIIs.

6—Cabinet silt loam, 2 to 12 percent slopes. This very deep, moderately well drained soil is on terraces. It formed in glacial lake-laid sediment derived from mixed sources and has a mantle of volcanic ash and loess. Slopes are undulating to rolling. Elevation is 2,100 to

2,800 feet. The average annual precipitation is about 34 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is about 90 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 0.5 inch thick. The surface layer is grayish brown, medium acid silt loam about 3 inches thick. The subsoil is light yellowish brown, medium acid silt loam about 8 inches thick. The next layer is white, strongly acid silty clay loam about 8 inches thick. The next layer is a buried subsoil of pink, very strongly acid clay about 16 inches thick. Below this to a depth of 60 inches or more are pink and light brown, medium acid and strongly acid, stratified very fine sandy loam and clay.

Permeability of this Cabinet soil is moderate to a depth of about 11 inches and very slow below this depth. Effective rooting depth is limited to a depth of 10 to 20 inches by the dense clay layer. Water is perched above the clay layer late in winter and in spring. Available water capacity is high. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

Included in this unit are small areas of Bonner silt loam, cool, on the lower lying outwash terraces; Pywell muck, undrained, and Wrencoe silty clay in depressional areas on terraces and in drainageways; and Mission silt loam on terraces.

This unit is used mainly for timber production, cultivated crops, and hay and pasture. It is also used for livestock grazing, wildlife habitat, homesite development, and recreation.

Cropland.—This unit is marginally suited to small grain. It is limited mainly by cool soil temperatures, wetness in spring, and the hazard of water erosion. Use of equipment is limited when the soil is wet. Tillage should be kept to a minimum.

Hay and pasture.—This unit is suited to hay and pasture. The main limitations are the depth to the clay layer, the wetness in spring, and cool soil temperatures. Grazing when the soil is moist results in compaction of the surface layer, poor tilth, and excessive runoff. Subsoiling increases the effective rooting depth. Among the adapted improved forage plants are timothy, meadow foxtail, reed canarygrass, tall fescue, and alsike clover.

Woodland.—Western redcedar, western white pine, grand fir, Douglas-fir, and western hemlock are the main woodland species on this unit. Among the trees of limited extent are western larch, ponderosa pine, and lodgepole pine. On the basis of a 50-year site curve, the average site index for grand fir and western white pine is 90. On the basis of a 100-year site curve, the average site index for Douglas-fir is 115. Yield tables indicate that the maximum average annual growth is 173 cubic feet per acre of grand fir and western white pine at 100 years of age and 132 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are seasonal wetness and susceptibility of the soil to compaction. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction. The seasonal wetness restricts the use of equipment to midsummer, when the soil is dry, or to midwinter, when the soil is frozen.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration. Because the rooting depth is restricted by the clay layer, trees are subject to windthrow.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,000 pounds of air-dry vegetation per acre to less than 150 pounds per acre as the canopy closes. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. Grazing when the soil is moist results in compaction of the surface layer, poor tilth, and excessive runoff.

Recreation.—This unit is moderately suited to recreational development. It is limited mainly by the hazard of water erosion, soil wetness in spring, and very slow permeability. Drainage should be provided for paths and trails. Cuts and fills should be seeded or mulched. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover.

Homesite development.—This unit is marginally suited to homesite development. The main limitations are wetness, very slow permeability, a hazard of frost heaving, and low soil strength. Specially designed waste disposal systems are needed. Septic tank absorption fields do not function properly late in winter and in spring. Measures to control runoff and erosion are needed if the plant cover is disturbed or removed. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Buildings and roads should be designed to offset the effects of low load supporting capacity and frost heaving.

This map unit is in capability subclass IVe and in woodland suitability subclass 1w.

7—Cabinet silt loam, 12 to 30 percent slopes. This very deep, moderately well drained soil is on dissected terraces. It formed in glacial lake-laid sediment derived from mixed sources and has a mantle of volcanic ash and loess. Elevation is 2,100 to 2,800 feet. The average annual precipitation is about 34 inches, the average

annual air temperature is about 43 degrees F, and the average frost-free period is about 90 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 0.5 inch thick. The surface layer is grayish brown, medium acid silt loam about 3 inches thick. The subsoil is light yellowish brown, medium acid silt loam about 8 inches thick. The next layer is white, strongly acid silty clay loam about 8 inches thick. The next layer is a buried subsoil of pink, very strongly acid clay about 16 inches thick. Below this to a depth of 60 inches or more are pink and light brown, medium acid and strongly acid, stratified very fine sandy loam and clay.

Permeability of this Cabinet soil is moderate to a depth of about 11 inches and very slow below this depth. Effective rooting depth is limited to a depth of 10 to 20 inches by the dense clay layer. Water is perched above the clay layer late in winter and in spring. Available water capacity is high. Runoff is very rapid, and the hazard of water erosion is very high.

Included in this unit are small areas of Pend Oreille silt loam in north-facing areas on dissected terraces and mountainsides; Mission silt loam on terrace breaks; Klootch gravelly sandy loam on north-facing mountainsides; and Treble gravelly sandy loam, high precipitation, in south-facing areas on dissected terraces and mountainsides.

This unit is used for timber production, livestock grazing, recreation, and wildlife habitat.

Woodland.—Western redcedar, western white pine, grand fir, Douglas-fir, and western hemlock are the main woodland species on this unit. Among the trees of limited extent are western larch, ponderosa pine, and lodgepole pine. On the basis of a 50-year site curve, the average site index is 90 for grand fir and 80 for western white pine. On the basis of a 100-year site curve, the average site index for Douglas-fir is 120. Yield tables indicate that the maximum average annual growth is 173 cubic feet per acre of grand fir at 100 years of age, 154 cubic feet per acre of western white pine at 100 years of age, and 141 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are the hazard of water erosion and seasonal wetness. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction. The soil is subject to slumping when saturated, especially if road cuts are made in the steeper areas. Locating roads in the more gently sloping areas and using adequate drainage systems reduce maintenance costs.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration. Because the rooting depth is restricted by the clay layer, trees are subject to windthrow.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,000 pounds of air-dry vegetation per acre to less than 150 pounds per acre as the canopy closes. Grazing when the soil is moist results in compaction of the surface layer, poor tilth, and excessive runoff. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

Recreation.—This unit is poorly suited to recreational development. It is limited mainly by the hazard of water erosion, slope, wetness in spring, and very slow permeability. Slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Drainage should be provided for paths and trails. Cuts and fills should be seeded or mulched. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover.

Homesite development.—This unit is poorly suited to homesite development. The main limitations are slope, wetness, very slow permeability, and a hazard of frost heaving.

This map unit is in capability subclass VIe and in woodland suitability subclass 1w.

8—Capehorn silt loam, 0 to 2 percent slopes. This very deep, poorly drained soil is on small valley bottoms and flood plains. It formed in glacial outwash and alluvium derived dominantly from granite, gneiss, and schist and has a mantle of volcanic ash and loess. Elevation is 2,075 to 4,200 feet. The average annual precipitation is about 36 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 75 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is yellowish brown, medium acid silt loam about 7 inches thick. The subsoil is light yellowish brown, medium acid gravelly silt loam about 8 inches thick. The substratum to a depth of 60 inches or more is mottled, white, slightly acid very gravelly loamy sand and very gravelly sand.

Permeability of this Capehorn soil is moderate to a depth of about 15 inches and very rapid below this depth. Effective rooting depth is limited by a seasonal high water table that is at a depth of 0 to 1.5 feet from January to June. Available water capacity is low. Runoff

is slow, and the hazard of water erosion is slight. This soil is subject to long periods of flooding late in winter and in spring.

Included in this unit are small areas of Elmira Variant loamy coarse sand on low stream terraces; Hoodoo silt loam on low stream terraces; and Bonner silt loam, cool, and Rathdrum silt loam, cool, on the higher terraces.

This unit is used for timber production, wildlife habitat, hay and pasture, recreation, and livestock grazing.

Cropland.—This unit is poorly suited to cultivated crops. It is limited mainly by cool soil temperatures and a short growing season.

Hay and pasture.—This unit is suited to hay and pasture. The main limitations are the seasonal high water table, cool soil temperatures, and a short growing season. Among the adapted improved forage plants are timothy, meadow foxtail, reed canarygrass, tall fescue, and alsike clover.

Woodland.—Western redcedar and western hemlock are the main woodland species on this unit. Among the trees of limited extent are western white pine, grand fir, and western larch. On the basis of a 50-year site curve, the average site index for western white pine is 85. Yield tables indicate that the maximum average annual growth is 163 cubic feet per acre of western white pine at 100 years of age.

The main limitations for the harvesting of timber are seasonal wetness and susceptibility of the soil to compaction. The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or to midwinter, when the soil is frozen. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees.

Plant competition and the hazard of flooding are the main concerns in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration. Survival of seedlings may be low where flooding occurs.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,200 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. If the shrubs on this unit are managed to create open areas, the unit produces a good stand of desirable grasses and forbs.

Recreation.—This unit is poorly suited to recreational development. It is limited mainly by wetness and the hazard of flooding.

Homesite development.—This unit is poorly suited to homesite development. The main limitations are the hazard of flooding, wetness, a hazard of seepage from septic tank absorption fields, and a hazard of frost heaving. Buildings and roads should be designed to offset the effects of flooding, wetness, and frost heaving. Specially designed waste disposal systems are needed.

This map unit is in capability subclass IVw and in woodland suitability subclass 1w.

9—Colburn very fine sandy loam, 0 to 4 percent slopes. This very deep, somewhat poorly drained soil is on alluvial fans and low terraces adjacent to flood plains. It formed in mixed alluvium derived dominantly from granitic and metamorphosed rock. Slopes are level to undulating. Elevation is 2,075 to 2,300 feet. The average annual precipitation is about 33 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 100 days.

Typically, the surface layer is brown, slightly acid very fine sandy loam about 3 inches thick. The upper 15 inches of the subsoil is light yellowish brown, slightly acid and neutral very fine sandy loam, and the lower 2 inches is very pale brown, neutral silt loam. The next layer is mottled, light gray, neutral fine sandy loam and loamy fine sand about 9 inches thick. The substratum to a depth of 60 inches or more is mottled, light gray, slightly acid and neutral fine sand.

Permeability of this Colburn soil is moderate to a depth of about 24 inches and rapid below this depth. Effective rooting depth is 60 inches or more. Available water capacity is low to moderate. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 2 to 3 feet late in winter and in spring. The soil is subject to rare periods of flooding.

Included in this unit are small areas of Selle fine sandy loam in the higher areas on terraces, Hoodoo silt loam and Pywell muck in swales and depressional areas, Elmira loamy sand on knolls and in the higher areas on terraces, and Mission silt loam in the higher areas on terraces. Also included are small areas of Capehorn silt loam on wet bottom lands adjacent to creeks.

This unit is used mainly for cultivated crops and for hay and pasture. It is also used for timber production, livestock grazing, wildlife habitat, recreation, and homesite development.

Cropland.—This unit is suited to cultivated crops. Deep-rooted crops are suited to areas where the natural drainage is adequate or where a drainage system has been installed.

Hay and pasture.—This unit is suited to hay and pasture. Among the adapted improved forage plants are timothy, tall fescue, smooth brome, reed canarygrass, clover, and alfalfa.

Woodland.—Western redcedar, western white pine, grand fir, and Douglas-fir are the main woodland species on this unit. Among the trees of limited extent are ponderosa pine, western larch, and lodgepole pine. On the basis of a 50-year site curve, the average site index for grand fir and western white pine is 85. Yield tables indicate that the maximum average annual growth of

grand fir and western white pine at 100 years of age is 163 cubic feet per acre.

The main limitations for the harvesting of timber are seasonal wetness and susceptibility of the soil to compaction. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,800 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

Recreation.—This unit is suited to recreational development. It is limited mainly by wetness in spring and rare periods of flooding.

Homesite development.—This unit is poorly suited to homesite development. The main limitations are the hazard of flooding, wetness, a hazard of seepage from septic tank absorption fields, and a hazard of frost heaving. Buildings and roads should be designed to offset the effects of flooding, the high water table, and frost heaving. Specially designed waste disposal systems are needed.

This map unit is in capability subclass IIIw and in woodland suitability subclass 1w.

10—Dufort silt loam, 5 to 45 percent slopes. This very deep, well drained, rolling to steep soil is on foothills and mountainsides. It formed in glacial till derived dominantly from granitic and metamorphosed rock and has a mantle of volcanic ash and loess. Elevation is 2,100 to 3,600 feet. The average annual precipitation is about 32 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 100 days.

Typically, the surface layer is brown, slightly acid silt loam about 2 inches thick. The upper 11 inches of the subsoil is yellowish brown, neutral silt loam, and the lower 11 inches is yellowish brown, medium acid gravelly silt loam. The substratum to a depth of 60 inches or more is light gray, neutral very gravelly sandy loam.

Permeability of this Dufort soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is low to moderate. Runoff is rapid to very rapid, and the hazard of water erosion is high to very high.

Included in this unit are small areas of Pend Oreille silt loam on north-facing side slopes and in ravines, Treble gravelly sandy loam on south-facing side slopes, Bonner gravelly silt loam in benchlike areas, and Sagle silt loam in concave, bowllike areas on foot slopes. Also included are small areas of Kootenai gravelly silt loam on side slopes and ridges and a soil that is similar to this Dufort soil but has slopes of 45 to 65 percent.

This unit is used mainly for timber production, livestock grazing, wildlife habitat, and recreation. It is also used for homesite development and for hay and pasture.

Cropland.—This unit is poorly suited to cultivated crops. It is limited mainly by cool soil temperatures, a short growing season, slope, and the hazard of water erosion.

Hay and pasture.—This unit is suited to hay and pasture. The main limitations are slope and the hazard of water erosion. Grazing when the soil is moist results in compaction of the surface layer, poor tilth, and excessive runoff. Among the adapted improved forage plants are orchardgrass, timothy, tall fescue, and white clover.

Woodland.—Grand fir, Douglas-fir, ponderosa pine, and lodgepole pine are the main woodland species on this unit. Among the trees of limited extent are western larch and western white pine. On the basis of a 50-year site curve, the average site index for grand fir is 75. On the basis of a 100-year site curve, the average site index for Douglas-fir is 115. Yield tables indicate that the maximum average annual growth is 144 cubic feet per acre of grand fir at 103 years of age and 132 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are slope, the hazard of water erosion, and susceptibility of the soil to compaction. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding disturbs the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,800 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes.

Recreation.—Most areas of this unit are poorly suited to recreational development because of slope. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as recreational sites. If the unit is used for recreational development, the main limitations are dustiness, slope, and the hazard of water erosion. Cuts and fills should be seeded or mulched. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover.

Homesite development.—Most areas of this unit are poorly suited to homesite development because of slope. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as homesites. Onsite investigation is required to identify these areas.

This map unit is in capability subclass VIe and in woodland suitability subclass 1r.

11—Dufort-Rock outcrop complex, 5 to 45 percent slopes. This map unit is in rolling to steep areas on foothills and mountainsides. Elevation is 2,100 to 3,600 feet.

This unit is about 40 percent Dufort silt loam and 30 percent Rock outcrop. The remaining 30 percent is included soils. The Dufort soil is on plane or concave side slopes, and Rock outcrop is on or near ridges and knobs. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Treble gravelly sandy loam on south-facing side slopes; Ardtoo gravelly loam on south-facing mountainsides near ridges; Pend Oreille silt loam on cool, north-facing side slopes and in ravines; and Lenz stony sandy loam near areas of Rock outcrop on steep shoulders and ridges. Also included are small areas of Bonner gravelly silt loam in benchlike areas and Sagle silt loam in concave, bowllike areas on foot slopes.

The Dufort soil is very deep and well drained. It formed in glacial till derived dominantly from granitic and metamorphic rock and has a mantle of volcanic ash and loess. The average annual precipitation is about 32 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 100 days.

Typically, the surface layer is brown, slightly acid silt loam about 2 inches thick. The upper 11 inches of the subsoil is yellowish brown, neutral silt loam, and the lower 11 inches is yellowish brown, medium acid gravelly silt loam. The substratum to a depth of 60 inches or more is light gray, neutral very gravelly sandy loam.

Permeability of this Dufort soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is low to moderate. Runoff is rapid to very rapid, and the hazard of water erosion is high to very high.

Rock outcrop consists of areas of exposed granite, gneiss, or schist that is hard and is fractured in places. Some soil material is in the cracks and crevices.

This unit is used mainly for timber production, livestock grazing, wildlife habitat, and recreation. It is also used for homesite development.

Woodland.—Grand fir, Douglas-fir, ponderosa pine, and lodgepole pine are the main woodland species on the Dufort soil. Among the trees of limited extent are western larch and western white pine. On the basis of a 50-year site curve, the average site index for grand fir is 75. On the basis of a 100-year site curve, the average site index for Douglas-fir is 115. Yield tables indicate that the maximum average annual growth is 144 cubic feet per acre of grand fir at 103 years of age, and 132 cubic feet per acre of Douglas-fir at 40 years of age. The areas of Rock outcrop in this unit will reduce the yield of the unit about 30 percent.

The main limitations for the harvesting of timber are slope, the hazard of water erosion, susceptibility of the soil to compaction, and the areas of Rock outcrop. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding disturbs the soil less. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction. The areas of Rock outcrop may cause breakage of timber and hinder yarding.

Plant competition and the areas of Rock outcrop are the main concerns in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration. The areas of Rock outcrop limit the even distribution of naturally regenerated tree seedlings.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,300 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes. The production of forage is limited by the areas of Rock outcrop, which generally interfere with the movement of livestock and limit the accessibility of forage.

Recreation.—Most areas of this unit are poorly suited to recreational development because of slope. Included in the unit, however, are areas of more nearly level soils that are more suitable for use as recreational sites. If this unit is used for recreational development, the main limitations are slope, dustiness, the hazard of water erosion, and the areas of Rock outcrop. Cuts and fills

should be seeded or mulched. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover.

Homesite development.—Most areas of this unit are poorly suited to homesite development. The main limitations are slope and the areas of Rock outcrop. Included in the unit, however, are areas of more nearly level soils that are more suitable for use as homesites. Onsite investigation is required to identify these areas.

This map unit is in capability subclass VIIs and in woodland suitability subclass 1x.

12—Elmira loamy sand, 0 to 8 percent slopes. This very deep, excessively drained soil is on terraces and dunes. It formed in sandy, glacial lake-laid sediment that has been reworked by wind and is derived from mixed sources. Elevation is 2,050 to 2,600 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is about 115 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2.5 inches thick. The surface layer is brown, slightly acid loamy sand about 4 inches thick. The upper part of the subsoil is light yellowish brown, slightly acid loamy sand about 21 inches thick, and the lower part to a depth of 60 inches or more is light brownish gray and pale brown, slightly acid sand.

Permeability of this Elmira soil is rapid. Effective rooting depth is 60 inches or more. Available water capacity is low. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

Included in this unit are small areas of Selle fine sandy loam in swales on terraces, Kaniksu sandy loam in the lower areas on terraces, Colburn very fine sandy loam on low alluvial fans and terraces, and Mission silt loam in the lower areas on terraces.

This unit is used mainly for timber production, livestock grazing, wildlife habitat, and recreation. It is also used for cultivated crops, hay and pasture, and homesite development.

Cropland.—This unit is suited to irrigated crops but is poorly suited to nonirrigated crops. It is limited mainly by droughtiness and the hazard of soil blowing. Because the soil is droughty, applications of irrigation water should be light and frequent. Soil blowing can be reduced by returning crop residue to the soil and practicing minimum tillage.

Hay and pasture.—This unit is suited to hay and pasture. If a high level of management is used, yields are fair in irrigated areas and poor in nonirrigated areas. Among the adapted improved forage plants are orchardgrass, smooth brome, tall fescue, alfalfa, and clover.

Woodland.—Ponderosa pine and Douglas-fir are the main woodland species on this unit. Among the trees of limited extent are western larch and lodgepole pine. On the basis of a 100-year site curve, the average site index for ponderosa pine and Douglas-fir is 115. Yield tables indicate that the maximum average annual growth of ponderosa pine and Douglas-fir at 40 years of age is 132 cubic feet per acre. The loose, sandy surface layer hinders the use of wheeled equipment, especially when the soil is dry. If seed trees are present, natural tree regeneration of cutover areas by ponderosa pine and Douglas-fir is adequate to produce a good stand of trees.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 20 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,000 pounds of air-dry vegetation per acre to less than 200 pounds per acre as the canopy closes.

Recreation.—This unit is well suited to recreational development. It has few limitations. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover.

Homesite development.—This unit is moderately suited to homesite development. The main limitation is the hazard of seepage from septic tank absorption fields. Specially designed waste disposal systems are needed. Plans for homesite development should provide for the preservation of as many trees as possible. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

This map unit is in capability subclass IVs and in woodland suitability subclass 1s.

13—Elmira Variant loamy coarse sand, 0 to 2 percent slopes. This very deep, poorly drained soil is on alluvial fans near lake shorelines. It formed in alluvium derived dominantly from granitic and metamorphosed rock and has a thin mantle of loess and volcanic ash. Elevation is 2,440 to 2,500 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is about 90 days.

Typically, the surface is covered with a mat of needles, leaves, twigs, and moss about 1 inch thick. The surface layer is light gray, strongly acid loamy coarse sand about 4 inches thick. The subsoil is yellowish brown, medium acid loamy coarse sand about 4 inches thick. The substratum to a depth of 60 inches or more is mottled, very pale brown and yellowish brown medium acid coarse sand.

Permeability of this Elmira Variant soil is very rapid. Effective rooting depth is limited by a seasonal high water table that is at a depth of 12 to 24 inches from February to June. Available water capacity is very low to low. Runoff is very slow, and the hazard of water erosion is slight. This soil is subject to rare periods of flooding.

Included in this unit are small areas of Capehorn silt loam on valley bottoms and in draws; Hoodoo silt loam

on bottom lands and in drainageways; Bonner silt loam, cool, in the higher areas on terraces; Pywell muck, undrained, in swampy depressional areas; and a soil that is similar to this Elmira Variant soil but is deeper to sand and is somewhat poorly drained.

This unit is used mainly for timber production, recreation, and wildlife habitat. It is also used as sites for homes and summer cabins.

Woodland.—Western hemlock, western redcedar, western white pine, and grand fir are the main woodland species on this unit. Among the trees of limited extent are lodgepole pine and western larch. On the basis of a 50-year site curve, the average site index is 65 for western white pine and 60 for grand fir. Yield tables indicate that the maximum average annual growth is 127 cubic feet per acre of western white pine at 105 years of age and 118 cubic feet per acre for grand fir at 105 years of age.

The seasonal wetness restricts the use of equipment to midsummer, when the soil is dry, or to midwinter, when the soil is frozen. The loose, sandy surface layer hinders the use of wheeled equipment, especially when the soil is dry. The seedling mortality rate may be high in summer because the soil lacks adequate moisture.

Recreation.—This unit is marginally suited to recreational development. It is limited mainly by seasonal wetness, rare periods of flooding, and the sandy texture of the soil.

Homesite development.—This unit is poorly suited to homesite development. The main limitations are the hazard of flooding, wetness, and a hazard of seepage from septic tank absorption fields. Buildings should be designed to offset the effects of flooding and the high water table. Specially designed waste disposal systems are needed. Topsoil needs to be added to establish plantings.

This map unit is in capability subclass IVw and in woodland suitability subclass 2w.

14—Haploxeralfs and Xerochrepts, 30 to 55 percent slopes. This map unit is on terrace escarpments. Elevation is 2,050 to 2,500 feet. The average annual precipitation is about 33 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 100 days.

Included in this unit are small areas of Bonner gravelly silt loam and Kootenai gravelly silt loam on side slopes, Sagle silt loam in benchlike areas, and a sandy soil on steep side slopes.

The Haploxeralfs are very deep and well drained to moderately well drained. They formed in silty, glacial lake-laid sediment derived from mixed sources and have a mantle of volcanic ash and loess. Typically, the surface is covered with a mat of needles, leaves, and twigs about 1 inch thick. The surface layer is brown, neutral silt loam about 3 inches thick. The upper 5 inches of the subsoil is pale brown, neutral silt loam, and the lower 28 inches is pale yellow, slightly acid silty clay loam, silty clay, or silt loam. The substratum to a depth of 60 inches or more is white and pale yellow, slightly acid, stratified fine sand to silty clay.

Permeability of the Haploxeralfs is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is very rapid, and the hazard of water erosion is very high.

The Xerochrepts are very deep and well drained. They formed in sandy, glacial lake-laid sediment, glacial till, or glacial outwash derived from mixed sources. In some areas these soils have a mantle of volcanic ash and loess. Typically, the surface is covered with a mat of needles, leaves, and twigs about 0.25 inch thick. The surface layer is brown, neutral fine sandy loam, gravelly silt loam, or sandy loam about 4 inches thick. The subsoil is light yellowish brown, slightly acid fine sandy loam, gravelly sandy loam, or sandy loam about 21 inches thick. The substratum to a depth of 60 inches or more is light yellowish brown, slightly acid very gravelly loamy sand or fine sand.

Permeability of the Xerochrepts is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is low. Runoff is very rapid, and the hazard of water erosion is very high.

This unit is used for timber production, limited livestock grazing, and wildlife habitat.

Woodland.—Western redcedar, western white pine, grand fir, and Douglas-fir are the main woodland species on the Haploxeralfs. Among the trees of limited extent are ponderosa pine and western larch. On the basis of a 50-year site curve, the average site index for grand fir and western white pine is 85. On the basis of a 100-year site curve, the average site index for Douglas-fir is 120. Yield tables indicate that the maximum average annual growth is 163 cubic feet per acre of grand fir and western white pine at 100 years of age and 141 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are slope and the hazard of water erosion. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Special design for roads is needed to overcome the limitation of slope and slumping of the soil when saturated.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Grand fir, Douglas-fir, ponderosa pine, and western larch are the main woodland species on the Xerochrepts. On the basis of a 50-year site curve, the average site index for grand fir is 60. On the basis of a 100-year site curve, the average site index for Douglas-fir is 110. Yield tables indicate that the maximum

average annual growth is 118 cubic feet per acre of grand fir at 105 years of age and 122 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are slope and the hazard of water erosion. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. If roads are constructed on these soils, slumping of cutbanks can be expected.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,000 pounds of air-dry vegetation per acre to less than 150 pounds per acre as the canopy closes. Slope may create livestock distribution problems.

Recreation.—This unit is poorly suited to recreational development. The main limitations are slope and the hazards of water erosion and soil slippage. Steepness of slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Drainage should be provided for paths and trails. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. The main limitation is slope.

This map unit is in capability subclass VIIe. The Haploxeralfs are in woodland suitability subclass 1r, and the Xerochrepts are in 2r.

15—Hoodoo silt loam, 0 to 1 percent slopes. This very deep, poorly drained soil is in drainageways and on bottom lands (fig. 4). It formed in alluvium derived dominantly from volcanic ash. Elevation is 2,100 to 2,800 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is about 100 days.

Typically, the surface layer is dark grayish brown and light brownish gray, neutral silt loam about 15 inches thick. The upper 37 inches of the underlying material is mottled, white and light gray, neutral and slightly acid silt loam and very fine sandy loam. The lower part to a depth of more than 60 inches is mottled, light gray, medium acid very cobbly silty clay loam and extremely gravelly silt loam.

Permeability of this Hoodoo soil is moderate to a depth of about 52 inches and moderately slow below this depth. Effective rooting depth is limited by a seasonal high water table that is at a depth of 12 to 24 inches from February to June. Available water capacity is high. Runoff is very slow, and the hazard of water erosion is slight. This soil is subject to very long periods of flooding late in winter and in spring.

Included in this unit are small areas of Bonner gravelly silt loam and Rathdrum silt loam on terraces adjacent to

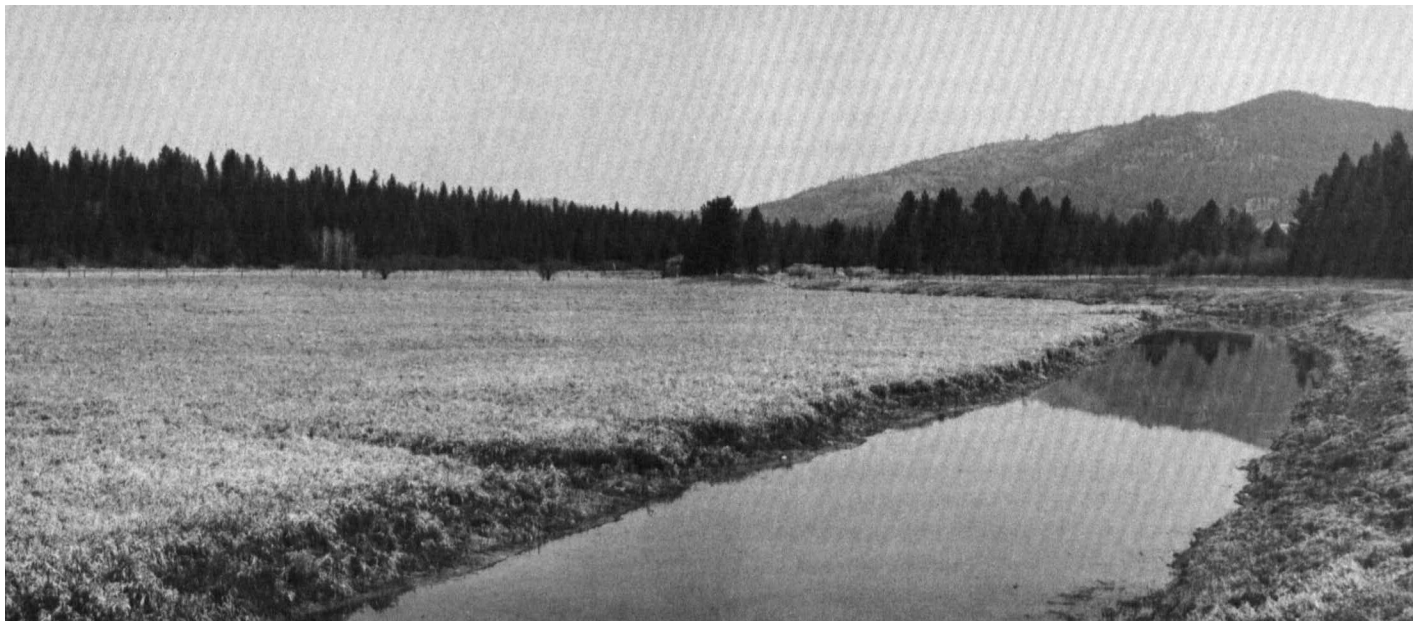


Figure 4.—Typical area of poorly drained Hoodoo silt loam, 0 to 1 percent slopes.

bottom lands and drainageways, Pywell muck in depressional areas on bottom lands, a soil that is similar to this Hoodoo soil but has peat below a depth of 30 inches, Capehorn silt loam in drainageways and on bottom lands, and Wrencoe silty clay in the lower lying areas on bottom lands.

This unit is used for crop production, hay and pasture, livestock grazing, and wildlife habitat.

Cropland.—This unit is suited to nonirrigated crops. It is limited mainly by seasonal wetness, the hazard of flooding in spring, and cool soil temperatures. Most climatically adapted crops can be grown if artificial drainage is provided. The risk of flooding can be reduced by the use of dikes, levees, and diversions.

Hay and pasture.—This unit is well suited to hay and pasture. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Among the adapted improved forage plants are timothy, meadow foxtail, reed canarygrass, tall fescue, and alsike clover.

Livestock grazing.—This unit can produce forage for livestock and big game animals continuously. The average annual production of air-dry vegetation ranges from 5,000 pounds per acre in favorable years to 3,000 pounds per acre in unfavorable years. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

Recreation.—This unit is poorly suited to recreational development. The main limitations are the hazard of flooding and wetness in spring. Protection from flooding is needed. Drainage should be provided for paths and trails.

Homesite development.—This unit is poorly suited to homesite development. The main limitations are the hazard of flooding, seasonal wetness, and a hazard of frost heaving. Buildings and roads should be designed to offset the effects of flooding, wetness, and frost heaving. Septic tank absorption fields do not function properly late in winter and in spring.

This map unit is in capability subclass IVw.

16—Hun gravelly silt loam, 35 to 65 percent slopes. This deep to very deep, well drained soil is on mountainsides. It formed in material derived dominantly from granite, gneiss, and schist and has a mantle of volcanic ash and loess. Elevation is 3,600 to 5,400 feet. The average annual precipitation is about 45 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 70 days.

Typically, the surface is covered with a mat of needles, leaves, twigs, and cones about 2 inches thick. The surface layer is light yellowish brown, medium acid gravelly silt loam about 9 inches thick. The subsoil is light yellowish brown, slightly acid very gravelly sandy loam about 16 inches thick. The substratum is very pale brown, medium acid extremely cobbly loamy sand about 30 inches thick. Fractured and weathered granite is at a depth of about 55 inches.

Permeability of this Hun soil is moderately rapid to a depth of about 25 inches and rapid below this depth. Effective rooting depth is 40 to 60 inches or more. Available water capacity is low. Runoff is very rapid, and the hazard of water erosion is very high.

Included in this unit are small areas of Jeru very stony sandy loam, warm, on foot slopes and steep mountainsides; Prouty gravelly loam at the higher elevations on mountainsides; Priestlake gravelly sandy loam at the lower elevations on foot slopes and steep mountainsides; and Vay gravelly silt loam at the lower elevations on mountainsides.

This unit is used mainly for timber production, wildlife habitat, recreation, and watershed. Some areas are used for limited livestock grazing.

Woodland.— Western hemlock, western redcedar, western white pine, and grand fir are the main woodland species on this unit. Among the trees of limited extent are western larch and Douglas-fir. On the basis of a 50-year site curve, the average site index for western white pine is 60. On the basis of a 100-year site curve, the average site index for Douglas-fir is 105. Yield tables indicate that the maximum average annual growth is 118 cubic feet per acre of western white pine at 105 years of age, and 112 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are slope and the hazard of water erosion. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. Special design for roads is needed to overcome the limitations of slope and the susceptibility of the soil to slumping when saturated.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 10 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,000 pounds of air-dry vegetation per acre to less than 150 pounds per acre as the canopy closes. Slope may create livestock distribution problems.

Recreation.—This unit is poorly suited to recreational development. It is limited mainly by slope and the hazard of water erosion. Steepness of slope limits the use of areas of this soil mainly to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. The main limitation is slope.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

This map unit is in capability subclass VIIe and in woodland suitability subclass 2f.

17—Jeru very stony loam, 35 to 65 percent slopes. This very deep, well drained soil is on mountainsides. It formed in colluvium and glacial till derived dominantly from granite, gneiss, and schist. Elevation is 4,800 to 6,000 feet. The average annual precipitation is about 50 inches, the average annual air temperature is about 40 degrees F, and the average frost-free period is about 45 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1.5 inches thick. The surface layer is yellowish brown, slightly acid very stony loam about 6 inches thick. The upper 17 inches of the subsoil is light yellowish brown, slightly acid gravelly loam, and the lower 9 inches is very pale brown, neutral very cobbly sandy loam. The substratum to a depth of 60 inches or more is very pale brown, neutral very stony sandy loam.

Permeability of this Jeru soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is low. Runoff is very rapid, and the hazard of water erosion is very high.

Included in this unit are small areas of Prouty gravelly loam on mountainsides; Hun gravelly silt loam at the lower elevations on mountainsides; Vay silt loam, cool, on north-facing mountainsides; and Brickel stony loam at the higher elevations on ridges. Also included are small areas of Rock outcrop and Rubble land.

This unit is used mainly for timber production, recreation, wildlife habitat, and watershed. It is also used for limited livestock grazing in a few areas.

Woodland.—Subalpine fir, Engelmann spruce, and western white pine are the main woodland species on this unit. On the basis of a 100-year site curve, the average site index is 65 for subalpine fir and 70 for Engelmann spruce. Yield tables indicate that the maximum average annual growth is 56 cubic feet per acre of subalpine fir at 115 years of age and 63 cubic feet per acre of Engelmann spruce at 110 years of age.

The main limitations for the harvesting of timber are stoniness and slope. Stones on the surface cause breakage of timber and hinder yarding. Cable yarding systems generally are used on this unit. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration. The mortality of seedlings is higher on ridgetops that are subject to strong, persistent winds than in other areas of this unit.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,200 pounds of air-dry vegetation per acre to less than 200 pounds per acre as the canopy closes. Slope may create livestock distribution problems.

Recreation.—This unit is poorly suited to recreational development. It is limited mainly by slope and the very stony surface layer. Steepness of slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. The main limitation is slope.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

This map unit is in capability subclass VIIs and in woodland suitability subclass 4x.

18—Jeru very stony sandy loam, warm, 5 to 35 percent slopes. This very deep, well drained soil is on mountainsides. It formed in colluvium and glacial till derived dominantly from granite, gneiss, and schist. Elevation is 3,600 to 4,800 feet. The average annual precipitation is about 45 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 70 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1.5 inches thick. The surface layer is yellowish brown, slightly acid very stony sandy loam about 6 inches thick. The subsoil is light yellowish brown, slightly acid gravelly sandy loam about 17 inches thick. The substratum to a depth of 60 inches or more is very pale brown, neutral very cobbly sandy loam and very stony sandy loam.

Permeability of this Jeru soil is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is low. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

Included in this unit are small areas of Priestlake gravelly sandy loam on mountainsides and foot slopes; Hun gravelly silt loam on mountainsides; Bonner silt loam, cool, on level benches; and Treble gravelly sandy loam, high precipitation, on south-facing mountainsides and foot slopes. Also included are small areas of Rock outcrop and Rubble land.

This unit is used for timber production, recreation, wildlife habitat, livestock grazing, and watershed.

Woodland.—Western hemlock, western redcedar, western white pine, and grand fir are the main woodland species on this unit. Among the trees of limited extent are Douglas-fir and western larch. On the basis of a 50-year site curve, the average site index for western white pine is 65. On the basis of a 100-year site curve, the average site index for Douglas-fir is 105. Yield tables indicate that the maximum average annual growth is 127 cubic feet per acre of western white pine at 105 years of age and 112 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are stoniness and equipment limitations. Stones on the surface cause breakage of timber, hinder yarding, and make the construction of roads difficult.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,000 pounds of air-dry vegetation per acre to less than 150 pounds per acre as the canopy closes.

Recreation.—Most areas of this unit are poorly suited to recreational development. The main limitations are slope and the very stony surface. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as recreational sites. Cuts and fills should be seeded or mulched.

Homesite development.—Most areas of this unit are poorly suited to homesite development because of large stones and slope. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as homesites. Onsite investigation is required to identify these areas.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

This map unit is in capability subclass VIIs and in woodland suitability subclass 2x.

19—Jeru very stony sandy loam, warm, 35 to 75 percent slopes. This very deep, well drained soil is on mountainsides. It formed in colluvium and glacial till derived dominantly from granite, gneiss, and schist. Elevation is 3,600 to 5,200 feet. The average annual precipitation is about 45 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 70 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1.5 inches thick. The surface layer is yellowish brown, slightly acid very stony sandy loam about 6 inches thick. The subsoil is light yellowish brown, slightly acid gravelly sandy loam about 17 inches thick. The substratum to a depth of 60 inches or more is very pale brown, neutral very cobbly sandy loam and very stony sandy loam.

Permeability of this Jeru soil is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is low. Runoff is very rapid, and the hazard of water erosion is very high.

Included in this unit are small areas of Priestlake gravelly sandy loam on mountainsides and foot slopes, Hun gravelly silt loam on mountainsides, Prouty gravelly loam at the higher elevations on mountainsides, and Ardtoo gravelly sandy loam on south-facing mountainsides. Also included are small areas of Rock outcrop and Rubble land.

This unit is used mainly for timber production, recreation, wildlife habitat, and watershed. It is also used for limited livestock grazing in some areas.

Woodland.—Western hemlock, western redcedar, western white pine, and grand fir are the main woodland species on this unit. Among the trees of limited extent are Douglas-fir and western larch. On the basis of a 50-year site curve, the average site index for western white pine is 65. On the basis of a 100-year site curve, the average site index for Douglas-fir is 105. Yield tables indicate that the maximum average annual growth is 127 cubic feet per acre of western white pine at 105 years of age and 112 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are slope, the hazard of water erosion, and stoniness. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. Stones on the surface cause breakage of timber, hinder yarding, and make the construction of roads difficult.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,000 pounds of air-dry vegetation per acre to less than 150 pounds per acre as the canopy closes. Slope may create livestock distribution problems.

Recreation.—This unit is poorly suited to recreational development. It is limited mainly by slope and the very stony surface. Steepness of slope limits the use of areas of this unit mainly to a few paths and trails, which should

extend across the slope. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. The main limitation is slope.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

This map unit is in capability subclass VIIs and in woodland suitability subclass 2x.

20—Kaniksu sandy loam, 0 to 4 percent slopes. This very deep, well drained, level to undulating soil is on plains and terraces. It formed in glacial outwash material derived dominantly from granite, gneiss, and schist and has a mantle of loess and volcanic ash. Elevation is 2,100 to 2,600 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is about 110 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1 inch thick. The surface layer is pale brown, slightly acid sandy loam about 7 inches thick. The upper 12 inches of the subsoil is light yellowish brown, slightly acid and neutral sandy loam, and the lower 28 inches is pale brown, neutral gravelly loamy sand. The substratum to a depth of 60 inches or more is variegated, neutral gravelly sand.

Permeability of this Kaniksu soil is moderately rapid to a depth of about 19 inches and rapid below this depth. Effective rooting depth is 60 inches or more. Available water capacity is low. Runoff is slow, and the hazard of water erosion is slight.

Included in this unit are small areas of Rathdrum silt loam in swales and depressional areas, Bonner gravelly silt loam on low terraces, and Elmira loamy sand and Selle fine sandy loam on dissected terraces.

This unit is used mainly for timber production, livestock grazing, wildlife habitat, and recreation. It is also used for cultivated crops, hay and pasture, and homesite development.

Cropland.—This unit is well suited to irrigated crops but is poorly suited to nonirrigated crops. Because the soil in this unit is droughty, applications of irrigation water should be light and frequent.

Hay and pasture.—This unit is suited to hay and pasture. If a high level of management is used, yields are good in irrigated areas and fair to poor in nonirrigated areas. Among the adapted improved forage plants are orchardgrass, smooth brome, tall fescue, and alfalfa.

Woodland.—Douglas-fir, ponderosa pine, western larch, and lodgepole pine are the main woodland species on this unit. On the basis of a 100-year site curve, the average site index for Douglas-fir is 105. Yield tables indicate that the maximum average annual growth of Douglas-fir at 40 years of age is 112 cubic feet per acre. This unit has few limitations for harvesting timber.

The low available water capacity of the surface layer reduces seedling survival. If seed trees are present, natural tree regeneration of cutover areas by ponderosa pine and Douglas-fir is adequate to produce a good stand of trees.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 15 to 20 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,800 pounds of air-dry vegetation per acre to less than 500 pounds per acre as the canopy closes.

Recreation.—This unit is well suited to recreational development. It has few limitations.

Homesite development.—This unit is suited to homesite development. The main limitation is a hazard of seepage from septic tank absorption fields, thus contaminating ground water. Specially designed waste disposal systems are needed. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

This map unit is in capability subclasses IIIs, irrigated, and IVs, nonirrigated. It is in woodland suitability subclass 2s.

21—Klootch gravelly sandy loam, 15 to 35 percent slopes. This moderately deep, well drained soil is on mountainsides. It formed in material derived dominantly from granite and has a thin mantle of loess and volcanic ash. Elevation is 2,600 to 3,600 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 75 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1.5 inches thick. The surface layer is brown, slightly acid gravelly sandy loam about 5 inches thick. The subsoil is yellowish brown and light yellowish brown, slightly acid very gravelly sandy loam about 21 inches thick. Hard, fractured granite is at a depth of about 26 inches.

Permeability of this Klootch soil is moderately rapid. Effective rooting depth is 20 to 40 inches. Available water capacity is very low. Runoff is rapid to very rapid, and the hazard of water erosion is high.

Included in this unit are small areas of Hun gravelly silt loam and Vay silt loam on mountainsides; Priestlake gravelly sandy loam on north-facing mountainsides and foot slopes; and Treble gravelly sandy loam, high precipitation, on south-facing mountainsides and foot slopes. Also included are small areas of Rock outcrop.

This unit is used mainly for timber production, recreation, wildlife habitat, and watershed. It is also used for limited livestock grazing in a few areas.

Woodland.—Western redcedar, Douglas-fir, and grand fir are the main woodland species on this unit. Among the trees of limited extent are western hemlock, western white pine, and western larch. On the basis of a 50-year site curve, the average site index for grand fir is 60. On the basis of a 100-year site curve, the average site index for Douglas-fir is 120. Yield tables indicate that the maximum average annual growth is 118 cubic feet per acre of grand fir at 105 years of age and 141 cubic feet per acre of Douglas-fir at 40 years of age.

When building roads, the deep cuts needed to provide a nearly level road surface can expose hard bedrock that is difficult to excavate.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,000 pounds of air-dry vegetation per acre to less than 150 pounds per acre as the canopy closes.

Recreation.—This unit is poorly suited to recreational development. Steepness of slope limits the use of areas of the unit mainly to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

Homesite development.—Most areas of this unit are poorly suited to homesite development because of slope. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as homesites. Onsite investigation is required to identify these areas.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation.

This map unit is in capability subclass VIe and in woodland suitability subclass 2d.

22—Klootch gravelly sandy loam, 35 to 65 percent slopes. This moderately deep, well drained soil is on mountainsides. It formed in material derived dominantly from granite and has a thin mantle of loess and volcanic ash. Elevation is 2,600 to 3,600 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 75 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1.5 inches thick. The surface layer is brown, slightly acid gravelly sandy loam about 5 inches thick. The subsoil is yellowish brown and light yellowish brown, slightly acid very gravelly sandy loam about 21 inches thick. Hard, fractured granite is at a depth of about 26 inches.

Permeability of this Klootch soil is moderately rapid. Effective rooting depth is 20 to 40 inches. Available water capacity is very low. Runoff is very rapid, and the hazard of water erosion is very high.

Included in this unit are small areas of Hun gravelly silt loam and Vay gravelly silt loam on mountainsides; Priestlake gravelly sandy loam on mountainsides and foothills; and Treble gravelly sandy loam, high precipitation, on south-facing mountainsides. Also included are small areas of Rock outcrop.

This unit is used mainly for timber production, recreation, wildlife habitat, and watershed. It is also used for limited livestock grazing in a few areas.

Woodland.—Western redcedar, Douglas-fir, and grand fir are the main woodland species on this unit. Among the trees of limited extent are western hemlock, western white pine, and western larch. On the basis of a 50-year site curve, the average site index for grand fir is 60. On the basis of a 100-year site curve, the average site index for Douglas-fir is 120. Yield tables indicate that the maximum average annual growth is 118 cubic feet per acre of grand fir at 105 years of age and 141 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are slope and the hazard of water erosion. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. The deep cuts needed to provide a nearly level road surface can expose hard bedrock that is difficult to excavate.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,000 pounds of air-dry vegetation per acre to less than 150 pounds per acre as the canopy closes. Slope may create livestock distribution problems.

Recreation.—This unit is poorly suited to recreational development. Steepness of slope limits its use mainly to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. The main limitation is slope.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful

management of the timber and understory vegetation on the unit.

This map unit is in capability subclass VIIe and in woodland suitability subclass 2d.

23—Kootenai gravelly silt loam, 0 to 4 percent slopes. This very deep, well drained, level to undulating soil is on terraces. It formed in glacial outwash material derived dominantly from granite, gneiss, and schist and has a mantle of loess and volcanic ash. Elevation is 2,100 to 2,600 feet. The average annual precipitation is about 28 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is about 110 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1 inch thick. The surface layer is grayish brown, slightly acid gravelly silt loam about 5 inches thick. The upper 17 inches of the subsoil is yellowish brown and light yellowish brown, slightly acid gravelly silt loam and gravelly loam, and the lower 4 inches is very pale brown, slightly acid very gravelly sandy loam. The substratum to a depth of 60 inches or more is variegated, slightly acid extremely gravelly loamy coarse sand.

Permeability of this Kootenai soil is moderate to a depth of about 26 inches and very rapid below this depth. Effective rooting depth is limited to a depth of 20 to 40 inches by sand and gravel. Available water capacity is low. Runoff is slow, and the hazard of water erosion is slight.

Included in this unit are small areas of Bonner gravelly silt loam in the lower areas; Rathdrum silt loam in swales and depressional areas; Elmira loamy sand in undulating, dunelike areas; and Kootenai gravelly silt loam on escarpments and terrace breaks.

This unit is used mainly for timber production, livestock grazing, wildlife habitat, recreation, and homesite development. It is also used for cultivated crops (fig. 5) and for hay and pasture.

Cropland.—This unit is well suited to irrigated crops, but it is poorly suited to nonirrigated crops. Because the soil in this unit is droughty, applications of irrigation water should be light and frequent.

Hay and pasture.—This unit is suited to hay and pasture. Among the adapted improved forage plants are orchardgrass, smooth brome, tall fescue, and alfalfa. If a high level of management is used, yields are good in irrigated areas and fair to poor in nonirrigated areas.

Woodland.—Douglas-fir, ponderosa pine, lodgepole pine, and western larch are the main woodland species on this unit. On the basis of a 100-year site curve, the average site index for ponderosa pine is 95. Yield tables indicate that the maximum average annual growth of ponderosa pine at 40 years of age is 94 cubic feet per acre. This unit has few limitations for harvesting timber. The low available water capacity of the surface layer reduces seedling survival. If seed trees are present, natural tree regeneration of cutover areas by ponderosa pine is adequate.

Figure 5.—Harvested field on Kootenai gravelly silt loam, 0 to 4 percent slopes.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 15 to 20 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,800 pounds of air-dry vegetation per acre to less than 500 pounds per acre as the canopy closes.

Recreation.—This unit is suited to recreational development. It is limited mainly by dustiness and the gravelly surface layer. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover.

Homesite development.—This unit is suited to homesite development. The main limitations are a hazard of frost heaving and a risk of seepage from septic tank absorption fields. Roads should be designed to offset the effects of frost heaving. Specially designed waste disposal systems are needed. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

This map unit is in capability subclasses IIIs, irrigated, and IVs, nonirrigated. It is in woodland suitability subclass 3f.

24—Kootenai gravelly silt loam, 20 to 55 percent slopes. This very deep, well drained soil is on breaks of terraces and on south-facing terrace escarpments. It formed in glacial till and outwash material derived dominantly from granite, gneiss, and schist and has a mantle of loess and volcanic ash. Elevation is 2,100 to 2,600 feet. The average annual precipitation is about 28 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is about 110 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1 inch thick. The surface layer is grayish brown, slightly acid gravelly silt loam about 5 inches thick. The upper 17 inches of the subsoil is yellowish brown and light yellowish brown, slightly acid gravelly silt loam and gravelly loam, and the lower 4 inches is very pale brown, slightly acid very gravelly sandy loam. The substratum to a depth of 60 inches or more is variegated, slightly acid extremely gravelly loamy coarse sand.

Permeability of this Kootenai soil is moderate to a depth of about 26 inches and very rapid below this depth. Effective rooting depth is limited to a depth of 20 to 40 inches by sand and gravel. Available water capacity is low. Runoff is very rapid, and the hazard of water erosion is very high.

Included in this unit are small areas of Bonner gravelly silt loam, Dufort silt loam, Pend Oreille silt loam, and Treble gravelly sandy loam.

This unit is used for timber production, livestock grazing, and wildlife habitat.

Woodland.—Douglas-fir, ponderosa pine, lodgepole pine, and western larch are the main woodland species on this unit. On the basis of a 100-year site curve, the average site index for ponderosa pine is 95. Yield tables indicate that the maximum average annual growth is 94 cubic feet per acre of ponderosa pine at 40 years of age.

The main limitations for the harvesting of timber are slope and the hazard of water erosion. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. If roads are constructed on this unit, slumping of cutbanks can be expected.

The low available water capacity of the surface layer reduces seedling survival. If seed trees are present, natural tree regeneration of cutover areas by ponderosa pine is adequate to produce a good stand of trees.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 15 to 20 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,700 pounds of air-dry vegetation per acre to less than 400 pounds per acre as the canopy closes.

Recreation.—This unit is poorly suited to recreational development. It is limited mainly by slope and the hazard of water erosion. Steepness of slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. The main limitation is slope.

This map unit is in capability subclass VIIe and in woodland suitability subclass 3f.

25—Kootenai-Bonner gravelly silt loams, 0 to 20 percent slopes. This map unit is in nearly level to hilly areas on glacial outwash terraces and recessional moraines. Elevation is 2,100 to 2,600 feet.

This unit is about 50 percent Kootenai gravelly silt loam, 0 to 20 percent slopes, and 35 percent Bonner gravelly silt loam, 0 to 4 percent slopes. The remaining 15 percent is included soils. The Kootenai soil is on the higher ridges and knolls, and the Bonner soil is in the lower swales and depressional areas. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Treble gravelly sandy loam on ridges and side slopes, Kaniksu sandy loam in the more nearly level areas on ridges and terraces, Rathdrum silt loam in swales and depressional areas, and Elmira loamy sand on ridges and knolls.

The Kootenai soil is very deep and well drained. It formed in glacial till and outwash derived dominantly from granite, gneiss, and schist and has a mantle of loess and volcanic ash. The average annual precipitation is about 30 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is about 110 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1 inch thick. The surface layer is grayish brown, slightly acid gravelly silt loam about 5 inches thick. The upper 17 inches of the subsoil is yellowish brown and light yellowish brown, slightly acid gravelly silt loam and gravelly loam, and the lower 4 inches is very pale brown, slightly acid very gravelly sandy loam. The substratum to a depth of 60 inches or more is variegated, slightly acid extremely gravelly loamy coarse sand.

Permeability of the Kootenai soil is moderate to a depth of about 26 inches and very rapid below this depth. Effective rooting depth is limited to a depth of 20 to 40 inches by sand and gravel. Available water capacity is low. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

The Bonner soil is very deep and well drained. It formed in glacial outwash derived dominantly from granite, gneiss, and schist and has a mantle of volcanic ash and loess. The average annual precipitation is about

30 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 100 days.

Typically, the surface is covered with a mat of needles and twigs about 1.3 inches thick. The surface layer is pale brown, slightly acid gravelly silt loam about 5 inches thick. The subsoil is pale brown and very pale brown, slightly acid gravelly silt loam and gravelly sandy loam about 24 inches thick. The substratum to a depth of 60 inches or more is very pale brown, slightly acid and neutral very gravelly loamy sand.

Permeability of the Bonner soil is moderate to a depth of about 29 inches and rapid to very rapid below this depth. Effective rooting depth is limited to a depth of 20 to 40 inches by sand and gravel. Available water capacity is low. Runoff is slow to medium, and the hazard of water erosion is slight to moderate.

Most areas of this unit are used for timber production, livestock grazing, wildlife habitat, and recreation. A few areas are used for cultivated crops, hay and pasture, and homesite development.

Cropland.—This unit is poorly suited to nonirrigated crops and is marginally suited to irrigated crops. If this unit is used for irrigated crops, the main limitations are runoff, the hazard of water erosion, low available water capacity, and slope.

Hay and pasture.—This unit is suited to hay and pasture. If a high level of management is used, yields are good in irrigated areas and fair to poor in nonirrigated areas.

Woodland.—Douglas-fir, ponderosa pine, lodgepole pine, and western larch are the main woodland species on the Kootenai soil. On the basis of a 100-year site curve, the average site index for ponderosa pine is 95. Yield tables indicate that the maximum average annual growth is 94 cubic feet per acre of ponderosa pine at 40 years of age.

This soil has few serious limitations for harvesting timber. The low available water capacity of the surface layer reduces seedling survival. If seed trees are present, natural regeneration of cutover areas by ponderosa pine is adequate.

Grand fir, Douglas-fir, ponderosa pine, western larch, and lodgepole pine are the main woodland species on the Bonner soil. On the basis of a 50-year site curve, the average site index for grand fir is 60. On the basis of a 100-year site curve, the average site index for Douglas-fir is 110. Yield tables indicate that the maximum average annual growth is 118 cubic feet per acre of grand fir at 105 years of age and 122 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations of this soil for the harvesting of timber are the high content of volcanic ash and susceptibility of the soil to compaction. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 15 to 20 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,800 pounds of air-dry vegetation per acre to less than 150 pounds per acre as the canopy closes.

Recreation.—This unit is suited to recreational development. It is limited mainly by dustiness, the hazard of water erosion, and slope. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Cuts and fills should be seeded or mulched.

Homesite development.—Most areas of this unit are marginally suited to homesite development because of slope. Included in the unit, however, are areas of more nearly level soils that are more suitable for use as homesites. Onsite investgation is required to identify these areas.

This map unit is in capability subclass IVe, irrigated and nonirrigated. The Kootenai soil is in woodland suitability subclass 3f, and the Bonner soil is in 2o.

26—Kruse silt loam, 30 to 65 percent slopes. This very deep, well drained soil is on mountainsides. It formed in material derived dominantly from gneiss and schist and has a mantle of loess and volcanic ash. Elevation is 2,200 to 3,800 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is about 110 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is brown and yellowish brown, neutral silt loam about 15 inches thick. The upper 36 inches of the subsoil is light yellowish brown and light brown, medium acid silty clay loam and clay loam, the lower part to a depth of 60 inches or more is pink, medium acid gravelly clay loam.

Permeability of this Kruse soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is very rapid, and the hazard of water erosion is very high.

Included in this unit are small areas of Melder loam and Ardtoo gravelly loam on south-facing mountainsides. Also included are small areas of Vassar silt loam and Vay gravelly silt loam on north-facing mountainsides.

This unit is used for timber production, limited livestock grazing, wildlife habitat, recreation, and watershed.

Woodland.—Grand fir, Douglas-fir, ponderosa pine, and western white pine are the main woodland species on this unit. Among the trees of limited extent are western larch and lodgepole pine. On the basis of a 50-year site curve, the average site index for grand fir is 85.

On the basis of a 100-year site curve, the average site index is 125 for Douglas-fir and 120 for ponderosa pine. Yield tables indicate that the maximum average annual growth is 163 cubic feet per acre of grand fir at 100 years of age, 154 cubic feet per acre of Douglas-fir at 40 years of age, and 141 cubic feet per acre of ponderosa pine at 40 years of age.

The main limitations for the harvesting of timber are slope and the hazard of water erosion. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. Special design for roads is needed to overcome the limitations of slope and the susceptibility of the soil to slumping when saturated.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 15 to 20 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,800 pounds of air-dry vegetation per acre to less than 150 pounds per acre as the canopy closes. Slope may create livestock distribution problems.

Recreation.—This unit is poorly suited to recreational development. It is limited mainly by slope and the hazard of water erosion. Steepness of slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. The main limitation is slope.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

This map unit is in capability subclass VIIe and in woodland suitability subclass 1r.

27—Kruse Variant silt loam, 5 to 20 percent slopes. This moderately deep, well drained, rolling to moderately steep soil is on mountain foot slopes. It formed in material derived dominantly from granite and has a mantle of volcanic ash and loess. Elevation is 2,500 to 3,000 feet. The average annual precipitation is about 38 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 75 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is yellowish brown and light yellowish brown, strongly acid silt loam about 10 inches thick. The upper 18 inches of the subsoil is light yellowish brown, strongly acid very gravelly sandy loam, and the lower 10 inches is yellow, strongly acid gravelly sandy clay loam. Weathered granite is at a depth of about 38 inches.

Permeability of this Kruse Variant soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is low. Runoff is medium to rapid, and the hazard of water erosion is high to very high.

Included in this unit are small areas of Klootch gravelly sandy loam and Priestlake gravelly sandy loam on north-facing mountain foot slopes; Treble gravelly sandy loam, high precipitation, on south-facing mountain foot slopes; and Bonner silt loam, cool, on benches and terraces.

This unit is used mainly for timber production, recreation, and wildlife habitat. It is also used for limited livestock grazing and as sites for homes and summer cabins.

Woodland.—Western hemlock, western redcedar, western white pine, and grand fir are the main woodland species on this unit. On the basis of a 50-year site curve, the average site index for western white pine is 70. Yield tables indicate that the maximum average annual growth is 135 cubic feet per acre of western white pine at 105 years of age.

Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,000 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes.

Recreation.—This unit is moderately suited to recreational development. The main limitations are the hazard of water erosion and slope. Cuts and fills should be seeded or mulched. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover.

Homesite development.—This unit is moderately suited to homesite development. The main limitations are depth to bedrock and slope. Cuts needed to provide essentially level building sites can expose bedrock. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Specially designed waste disposal systems are needed. Measures to control runoff and erosion are needed if the plant cover is disturbed or removed.

This map unit is in capability subclass VIe and in woodland suitability subclass 1o.

28—Lenz-Rock outcrop association, 30 to 65 percent slopes. This map unit is on south-facing mountainsides. Elevation is 2,500 to 4,000 feet. The average annual precipitation is about 32 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is about 115 days.

This unit is about 45 percent Lenz stony sandy loam and 25 percent Rock outcrop. The remaining 30 percent is included soils. The Lenz soil is on convex side slopes, and Rock outcrop is on or near ridges.

Included in this unit are small areas of Ardtoo gravelly loam on east- and west-facing side slopes, Treble gravelly sandy loam in concave areas and in the less sloping areas, Pend Oreille silt loam in swales and benchlike areas, and a shallow, very stony soil on ridges near Rock outcrop. Also included are small areas of Melder loam on south-facing, plane or concave side slopes.

The Lenz soil is moderately deep and well drained. It formed in material derived dominantly from granite, gneiss, and schist and has a small amount of loess in the upper part. Typically, the surface is covered with a mat of leaves and twigs about 0.5 inch thick. The surface layer is dark grayish brown, slightly acid stony sandy loam about 7 inches thick. The subsoil is pale brown and very pale brown, medium acid very gravelly and extremely gravelly sandy loam about 17 inches thick. Fractured granite is at a depth of about 24 inches.

Permeability of this Lenz soil is moderately rapid. Effective rooting depth is 20 to 40 inches. Available water capacity is very low. Runoff is very rapid, and the hazard of water erosion is very high.

Rock outcrop consists of exposed areas of hard granite, gneiss, or schist that is fractured in places as a result of weathering. Areas of Rock outcrop are not suitable for most land uses.

This unit is used for timber production, livestock grazing, wildlife habitat, and watershed.

Woodland.—Douglas-fir and ponderosa pine are the main woodland species on the Lenz soil. Among the trees of limited extent are lodgepole pine and western larch. On the basis of a 100-year site curve, the average site index is 90 for Douglas-fir and 95 for ponderosa pine. Yield tables indicate that the maximum average annual growth is 85 cubic feet per acre of Douglas-fir at 40 years of age and 94 cubic feet per acre of ponderosa pine at 40 years of age. The areas of Rock outcrop in this unit will reduce yield about 25 percent.

The main limitations for the harvesting of timber are slope, the hazard of water erosion, and the areas of Rock outcrop. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. The areas of Rock outcrop may cause breakage of timber and hinder yarding. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. The deep cuts needed to provide a nearly level road surface can expose hard bedrock that is difficult to excavate.

Seedling mortality is the main concern in the production of timber. The low available water capacity of the surface layer reduces seedling survival. The areas of Rock outcrop limit the even distribution of naturally regenerated tree seedlings.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 20 to 25 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,200 pounds of air-dry vegetation per acre to less than 500 pounds per acre as the canopy closes. The production of forage grazing is limited by slope and the areas of Rock outcrop, which also limit livestock movement and accessibility of forage.

Recreation. This unit is poorly suited to recreational development. It is limited mainly by slope and the areas of Rock outcrop. Steepness of slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope.

Homesite development.—This unit is poorly suited to homesite development. The main limitations are slope and the areas of Rock outcrop.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

The Lenz soil is in capability subclass VIIe, and Rock outcrop is in capability subclass VIIIs. This map unit is in woodland suitability subclass 3x.

29—Melder loam, 15 to 35 percent slopes. This deep to very deep, well drained soil is on south-facing mountainsides. It formed in material derived dominantly from granite, gneiss, and schist and has a mantle of loess and volcanic ash. Elevation is 2,200 to 4,000 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is about 110 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 0.5 inch thick. The surface layer is dark grayish brown and pale brown, slightly acid loam about 9 inches thick. The upper 24 inches of the subsoil is light yellowish brown and very pale brown, neutral gravelly loam and very gravelly heavy loam, and the lower 35 inches is very pale brown, medium acid very gravelly sandy loam. Weathered granite is at a depth of about 68 inches.

Permeability of this Melder soil is moderately slow. Effective rooting depth is 40 inches to 60 inches or more. Available water capacity is low. Runoff is rapid to

very rapid, and the hazard of water erosion is high to very high.

Included in this unit are small areas of a soil that is similar to this Melder soil but is 20 to 40 inches deep to bedrock and is on south-facing, convex side slopes; Ardtoo gravelly loam on east- and west-facing side slopes; Lenz stony sandy loam in south-facing areas on ridges and on convex side slopes; and Kruse silt loam on east- and west-facing side slopes. Also included are small areas of Moscow loam on east- and west-facing side slopes and foot slopes.

Most areas of this unit are used for timber production, livestock grazing, wildlife habitat, and recreation. A few areas are used for homesite development.

Woodland.—Douglas-fir and ponderosa pine are the main woodland species on this unit. On the basis of a 100-year site curve, the average site index for Douglas-fir and ponderosa pine is 115. Yield tables indicate that the maximum average annual growth is 132 cubic feet per acre of Douglas-fir and ponderosa pine at 40 years of age.

Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration. The seedling mortality rate may be high in summer because of the lack of adequate moisture in the soil.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 15 to 25 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,600 pounds of air-dry vegetation per acre to less than 400 pounds per acre as the canopy closes.

Recreation.—This unit is poorly suited to recreational development. It is limited mainly by slope and the hazard of water erosion. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. The main limitations are slope and the hazard of water erosion. Measures to control runoff and erosion are needed if the plant cover is disturbed or removed.

This map unit is in capability subclass VIe and in woodland suitability subclass 1r.

30—Melder loam, 35 to 65 percent slopes. This deep to very deep, well drained soil is on south-facing mountainsides. It formed in material derived dominantly from granite, gneiss, and schist and has a mantle of loess and volcanic ash. Elevation is 2,200 to 4,000 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is about 110 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 0.5 inch thick. The surface layer is dark grayish brown and pale brown, slightly acid loam about 9 inches thick. The upper 24 inches of the subsoil is light yellowish brown and very pale brown, neutral gravelly loam and very gravelly heavy loam, and the lower 35 inches is very pale brown, medium acid very gravelly sandy loam. Weathered granite is at a depth of about 68 inches.

Permeability of this Melder soil is moderately slow. Effective rooting depth is 40 inches to 60 inches or more. Available water capacity is low. Runoff is very rapid, and the hazard of water erosion is very high.

Included in this unit are small areas of a soil that is similar to this Melder soil but is 20 to 40 inches deep to bedrock and is on south-facing, convex side slopes; Ardtoo gravelly loam on east- and west-facing side slopes; Vay silt loam on north-facing side slopes and in ravines; and Lenz stony sandy loam in south-facing areas on ridges and on convex side slopes.

This unit is used for timber production, limited livestock grazing, wildlife habitat, and recreation.

Woodland.—Douglas-fir and ponderosa pine are the main woodland species on this unit. On the basis of a 100-year site curve, the average site index for Douglas-fir and ponderosa pine is 115. Yield tables indicate that the maximum average annual growth is 132 cubic feet per acre of Douglas-fir and ponderosa pine at 40 years of age.

The main limitations for the harvesting of timber are slope and the hazard of water erosion. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration. The seedling mortality rate may be high in summer because of the lack of adequate moisture in the soil.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 15 to 25 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,600 pounds of air-dry vegetation per acre to less than 400 pounds per acre as the canopy closes. Slope may create livestock distribution problems.

Recreation.—This unit is poorly suited to recreational development. Steepness of slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. The main limitation is slope.

This map unit is in capability subclass VIIe and in woodland suitability subclass 1r.

31—Mission silt loam, 0 to 2 percent slopes. This somewhat poorly drained soil is shallow to a hardpan and is on terraces. It formed in silty glacial lake-laid sediment derived from mixed sources and has a mantle of volcanic ash and loess. Elevation is 2,050 to 2,300 feet. The average annual precipitation is about 32 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 115 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is grayish brown, neutral silt loam about 2 inches thick. The upper part of the subsoil is yellowish brown, slightly acid silt loam about 9 inches thick and the lower part is mottled, light gray and pale brown, medium acid, dense silt loam about 9 inches thick. The next layer is mottled, light gray, medium acid silt about 12 inches thick. The next layer is a buried subsoil of light yellowish brown and pale yellow, strongly acid silt loam and silty clay loam about 15 inches thick. The substratum to a depth of 60 inches or more is pale yellow and light yellowish brown, strongly acid and slightly acid, stratified very fine sandy loam and fine sand.

Permeability of this Mission soil is very slow. Effective rooting depth is limited to a depth of 10 to 20 inches by the hardpan. Available water capacity is moderate. Runoff is slow, and the hazard of water erosion is slight. Water is perched above the hardpan late in winter and in spring.

Included in this unit are small areas of Selle fine sandy loam in the higher areas on terraces and near shorelines; a soil that is similar to the Mission soil but is moderately well drained, does not have a hardpan, and is in the higher areas on terraces; Colburn very fine sandy loam on the lower alluvial fans and terraces; and Bonner gravelly silt loam on the higher terraces. Also included are small areas of Hoodoo and Odenson silt loams in wet depressional areas and on bottom lands.

This unit is used mainly for cultivated crops, hay and pasture, and homesite development. It is also used for timber production, livestock grazing, wildlife habitat, and recreation.

Cropland.—This unit is suited to nonirrigated small grain. It is limited mainly by the depth to the hardpan, restricted rooting depth, very slow permeability, and wetness. Subsoiling increases the effective rooting depth. The water table that builds up during the rainy period in spring generally limits the suitability of this unit for deep-rooted crops.

Hay and pasture.—This unit is suited to hay and pasture (fig. 6). The main limitations are the depth to the hardpan, restricted rooting depth, wetness, and very slow permeability. Subsoiling increases the effective rooting depth. Grazing when the soil is moist results in compaction of the surface layer, poor tilth, and excessive runoff. Among the adapted improved forage plants are smooth brome, orchardgrass, tall fescue, timothy, and clover.

Woodland.—Western redcedar, western white pine, grand fir, and Douglas-fir are the main woodland species on this unit. Among the trees of limited extent are western larch and ponderosa pine. On the basis of a 50-year site curve, the average site index for western white pine and grand fir is 85. On the basis of a 100-year site curve, the average site index for Douglas-fir is 120. Yield tables indicate that the maximum average annual growth is 163 cubic feet per acre of western white pine and grand fir at 100 years of age and 141 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are the seasonal wetness and susceptibility of the soil to compaction. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction.

Plant competition and the hazard of windthrow are the main concerns in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration. Because the rooting depth is restricted by the hardpan, trees are subject to windthrow.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,000 pounds of air-dry vegetation per acre to less than 150 pounds per acre as the canopy closes. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

Recreation.—This unit is suited to recreational development. It is limited mainly by wetness in spring.

Homesite development.—This unit is poorly suited to homesite development. The main limitations are wetness, very slow permeability, and a hazard of frost heaving. Buildings and roads should be designed to offset the effects of frost heaving and the perched water table. Septic tank absorption fields do not function properly late in winter and in spring; therefore, specially designed waste disposal systems are needed. Absorption lines should be placed below the very slowly permeable layer. Increasing the size of the absorption

Figure 6.—Rolled bales of hay on Mission silt loam, 0 to 2 percent slopes.

area helps to compensate for the very slow permeability. Topsoil can be stockpiled and used to reclaim areas disturbed during construction.

This map unit is in capability subclass IVs and in woodland suitability subclass 1d.

32—Mission silt loam, 2 to 12 percent slopes. This somewhat poorly drained, undulating to rolling soil is shallow to a hardpan and is on terraces. It formed in silty glacial lake-laid sediment derived from mixed sources and has a mantle of volcanic ash and loess. Elevation is 2,050 to 2,300 feet. The average annual precipitation is about 32 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 115 days.

Typically, the surface is covered with a mat of needles and twigs about 2 inches thick. The surface layer is grayish brown, neutral silt loam about 2 inches thick. The upper part of the subsoil is yellowish brown, slightly acid silt loam about 9 inches thick, and the lower part is mottled, light gray and pale brown, medium acid, dense silt loam about 9 inches thick. The next layer is mottled, gray, medium acid silt about 12 inches thick. The next layer is a buried subsoil of light yellowish brown and pale yellow, strongly acid silt loam and silty clay loam about 15 inches thick. The substratum to a depth of 60 inches or more is pale yellow and light yellowish brown, strongly acid and slightly acid, stratified very fine sandy loam and fine sand.

Permeability of this Mission soil is very slow. Effective rooting depth is limited to a depth of 10 to 20 inches by the hardpan. Available water capacity is moderate. Runoff is medium, and the hazard of water erosion is moderate to high. Water is perched above the hardpan late in winter and in spring.

Included in this unit are small areas of Selle fine sandy loam in the higher areas of terraces and near shorelines; a soil that is similar to this Mission soil but is moderately well drained, does not have a hardpan, and is in the higher areas on terraces; Colburn very fine sandy loam on the lower alluvial fans and terraces; and Bonner gravelly silt loam on the higher terraces. Also included are small areas of Hoodoo silt loam in wet depressional areas and on bottom lands and Wrencoe silty clay on flood plains adjacent to shorelines and riverbanks.

This unit is used mainly for cultivated crops and for hay and pasture. It is also used for homesite development, timber production, livestock grazing, wildlife habitat, and recreation.

Cropland.—This unit is suited to nonirrigated crops. It is limited mainly by the depth to the hardpan, restricted

rooting depth, very slow permeability, wetness, and the hazard of water erosion. Subsoiling increases the effective rooting depth. The water table that builds up during the rainy period in spring generally limits the suitability of this unit for deep-rooted crops.

Hay and pasture.—This unit is suited to hay and pasture. The main limitations are the depth to the hardpan, restricted rooting depth, wetness, and very slow permeability. Subsoiling increases the effective rooting depth. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Among the adapted improved forage plants are smooth brome, orchardgrass, tall fescue, timothy, and clover.

Woodland.—Western redcedar, western white pine, grand fir, and Douglas-fir are the main woodland species on this unit. Among the trees of limited extent are western larch and ponderosa pine. On the basis of a 50-year site curve, the average site index for western white pine and grand fir is 85. On the basis of a 100-year site curve, the average site index for Douglas-fir is 120. Yield tables indicate that the maximum average annual growth is 163 cubic feet per acre of western white pine and grand fir at 100 years of age and 141 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are a seasonal wetness and susceptibility of the soil to compaction. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction.

Plant competition and the hazard of windthrow are the main concerns in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration. Because the rooting depth is restricted by the hardpan, trees are subject to windthrow.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,000 pounds of air-dry vegetation per acre to less than 150 pounds per acre as the canopy closes. Grazing should be delayed until the soil in this unit has drained sufficiently and is firm enough to withstand trampling by livestock.

Recreation.—This unit is moderately suited to recreational development. It is limited mainly by the hazard of water erosion and wetness in spring. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by limiting traffic. Drainage should be provided for paths and trails.

Homesite development.—This unit is poorly suited to homesite development. The main limitations are wetness, very slow permeability, and a hazard of frost heaving. Roads and buildings should be designed to offset the effects of the perched water table and frost heaving. Septic tank absorption fields do not function properly late in winter and in spring, therefore, specially designed waste disposal systems are needed. Absorption lines should be placed below the very slowly permeable layer. Increasing the size of the absorption area helps to compensate for the very slow permeability. Topsoil can be stockpiled and used to reclaim areas disturbed during construction.

This map unit is in capability subclass IVe and in woodland suitability subclass 1d.

33—Mission silt loam, 12 to 30 percent slopes. This somewhat poorly drained, rolling to hilly soil is shallow to a hardpan and is on dissected terraces. It formed in silty glacial lake-laid sediment derived from mixed sources and has a mantle of volcanic ash and loess. Elevation is 2,050 to 2,500 feet. The average annual precipitation is about 32 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 115 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is grayish brown, neutral silt loam about 2 inches thick. The upper part of the subsoil is yellowish brown, slightly acid silt loam about 9 inches thick, and the lower part is mottled, light gray and pale brown, medium acid, dense silt loam about 9 inches thick. The next layer is mottled, light gray, medium acid silt about 12 inches thick. The next layer is a buried subsoil of light yellowish brown and pale yellow, strongly acid silt loam and silty clay loam about 15 inches thick. The substratum to a depth of 60 inches or more is pale yellow and light yellowish brown, strongly acid and slightly acid, stratified very fine sandy loam and fine sand.

Permeability of this Mission soil is very slow. Effective rooting depth is limited to a depth of 10 to 20 inches by the hardpan. Available water capacity is moderate. Runoff is very rapid, and the hazard of water erosion is very high. Water is perched above the hardpan late in winter and in spring.

Included in this unit are small areas of Mission silt loam in the more nearly level areas on terraces, Haploxeralfs and Xerochrepts on terrace escarpments, and Pend Oreille and Dufort silt loams on rolling to steep foot slopes. Also included are small areas of Odenson silt loam in wet depressional areas adjacent to drainageways.

This unit is used mainly for timber production, livestock grazing, wildlife habitat, and recreation. It is also used for homesite development and for hay and pasture.

Cropland.—This unit is poorly suited to cultivated crops. It is limited mainly by slope and the hazard of water erosion.

Hay and pasture.—This unit is suited to hay and pasture. The main limitations are slope and the hazard of water erosion. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Among the adapted improved forage plants are smooth brome, orchardgrass, tall fescue, timothy, and clover.

Woodland.—Western redcedar, western white pine, grand fir, and Douglas-fir are the main woodland species on this unit. Among the trees of limited extent are western larch and ponderosa pine. On the basis of a 50-year site curve, the average site index for western white pine and grand fir is 85. On the basis of a 100-year site curve, the average site index for Douglas-fir is 120. Yield tables indicate that the maximum average annual growth is 163 cubic feet per acre of western white pine and grand fir at 100 years of age and 141 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are the hazard of water erosion, seasonal wetness, and susceptibility of the soil to compaction. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction. The soil in this unit is subject to slumping when saturated, especially if road cuts are made in the steeper areas. Locating roads in the more gently sloping areas and using adeqate drainage systems reduce maintenance costs.

Plant competition and the hazard of windthrow are the main concerns in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration. Because the rooting depth is restricted by the hardpan, trees are subject to windthrow.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,000 pounds of air-dry vegetation per acre to less than 150 pounds per acre as the canopy closes. Grazing should be delayed until the soil in this unit has drained sufficiently and is firm enough to withstand trampling by livestock.

Recreation.—Most areas of this unit are poorly suited to recreational development because of slope. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as recreational sites. If this unit is used for recreational development, the main limitations are slope, the hazard of water erosion, and wetness in spring. Drainage should be provided for paths and trails. Cuts and fills on this unit should be seeded or mulched. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover.

Homesite development.—Most areas of this unit are poorly suited to homesite development. The main limitations are slope and the hazard of soil slippage. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as homesites. Onsite investigation is required to identify these areas.

This map unit is in capability subclass VIe and in woodland suitability subclass 1d.

34—Odenson silt loam, 0 to 2 percent slopes. This very deep, poorly drained soil is in low areas on terraces. It formed in silty glacial lake-laid sediment derived from mixed sources and has a mantle of loess and volcanic ash. Elevation is 2,120 to 2,240 feet. The average annual precipitation is about 32 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is about 100 days.

Typically, the surface layer is grayish brown and brown, neutral and mildly alkaline silt loam about 9 inches thick. The subsoil is mottled, white and pale yellow, mildly alkaline and moderately alkaline silty clay loam about 26 inches thick. The substratum to a depth of 65 inches or more is mottled, pale yellow, moderately alkaline, stratified silt loam, silty clay loam, silty clay, and very fine sandy loam.

Permeability of this Odenson soil is slow. Effective rooting depth is limited by a seasonal high water table that is at a depth of 6 to 24 inches from February to June. Available water capacity is high. Runoff is very slow, and the hazard of water erosion is none to slight.

Included in this unit are small areas of Mission silt loam in the higher areas on terraces, Selle fine sandy loam in the highest areas on terraces and knolls, Colburn very fine sandy loam in intermediate areas on terraces, and Hoodoo silt loam in the lower areas of drainageways on terraces. Also included are small areas of Wrencoe silty clay in wet depressional areas and on bottom lands, and Pywell muck in the lowest areas of wet depressional areas and bottom lands.

This unit is used mainly for hay and pasture and for wildlife habitat. A few areas are used as homesites.

Cropland.—This unit is marginally suited to cultivated crops. It is limited mainly by wetness and cool soil temperatures.

Hay and pasture.—This unit is suited to hay and pasture (fig. 7). Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. Among the adapted improved

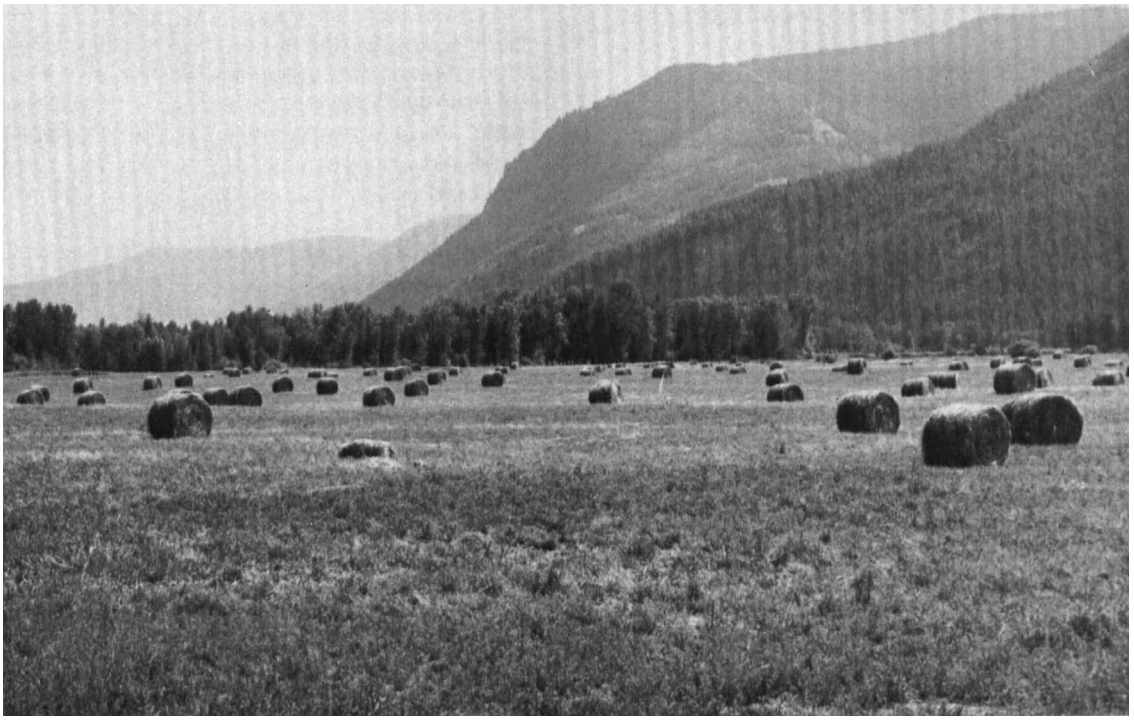


Figure 7.—Hay grown on Odenson silt loam, 0 to 2 percent slopes.

forage plants are timothy, meadow foxtail, reed canarygrass, tall fescue, and alsike clover.

Recreation.—This unit is poorly suited to recreational development. The main limitation is wetness in winter and spring. Drainage should be provided for paths and trails.

Homesite development.—This unit is poorly suited to homesite development; however, population growth has resulted in increased construction of homes on it. The main limitations are wetness, slow permeability, and a hazard of frost heaving, and low soil strength. Septic tank absorption fields do not function properly on this wet soil late in winter and in spring; therefore, specially designed waste disposal systems are needed. Roads and buildings should be designed to offset the effects of the seasonal high water table, frost heaving, and low soil strength.

This map unit is in capability subclass IVw.

35—Pend Oreille silt loam, 5 to 45 percent slopes. This very deep, well drained, rolling to steep soil is on foothills and mountainsides. It formed in glacial till derived dominantly from granitic and metamorphic rock and has a mantle of volcanic ash and loess. Elevation is 2,100 to 3,600 feet. The average annual precipitation is about 32 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is about 90 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is light yellowish brown, neutral silt loam about 4 inches thick. The subsoil is light yellowish brown, slightly acid silt loam and loam about 13 inches thick. The next layer is pale brown, medium acid and slightly acid gravelly sandy loam about 24 inches thick. The substratum to a depth of 60 inches or more is very pale brown, slightly acid very cobbly sandy loam.

Permeability of this Pend Oreille soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Runoff is medium to very rapid, and the hazard of water erosion is high to very high.

Included in this unit are small areas of Dufort silt loam and Treble gravelly sandy loam on rolling to steep, broken, south-facing side slopes; Vay gravelly silt loam on north-facing mountainsides; Bonner gravelly silt loam on level benches; Sagle silt loam in concave, bowllike areas; and Hoodoo silt loam in wet depressional areas.

This unit is used mainly for timber production, livestock grazing, wildlife habitat, and recreation. It is also used for homesite development and for hay and pasture.

Cropland.—This unit is poorly suited to cultivated crops. It is limited mainly by cool soil temperatures, a

short growing season, the hazard of water erosion, and slope.

Hay and pasture.—This unit is suited to hay and pasture. The main limitations are slope in the steeper areas and the hazard of water erosion. Grazing when the soil is moist results in compaction of the surface layer, poor tilth, and excessive runoff. Among the adapted improved forage plants are intermediate wheatgrass, smooth brome, tall fescue, and orchardgrass.

Woodland.—Western redcedar, western white pine, grand fir, and Douglas-fir are the main woodland species on this unit. Among the trees of limited extent are western larch, ponderosa pine, and lodgepole pine. On the basis of a 50-year site curve, the average site index is 75 for grand fir and 70 for western white pine. On the basis of a 100-year site curve, the average site index for Douglas-fir is 115. Yield tables indicate that the maximum average annual growth is 144 cubic feet per acre of grand fir at 103 years of age, 135 cubic feet per acre of western white pine at 105 years of age, and 132 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are slope in the steeper areas, the hazard of water erosion, and susceptibility of the soil to compaction. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding disturbs the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,000 pounds of air-dry vegetation per acre to less than 50 pounds per acre as the canopy closes.

Recreation.—Most areas of this unit are poorly suited to recreational development. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as recreational sites. If this unit is used for recreational development, the main limitations are dustiness, the hazard of water erosion, and slope. Cuts and fills should be seeded or mulched. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover.

Homesite development.—Most areas of this unit are poorly suited to homesite development. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as homesites. Onsite investigation is required to identify these areas.

This map unit is in capability subclass VIe and in woodland suitability subclass 1r.

36—Pend Oreille-Hoodoo silt loams, 0 to 30 percent slopes. This map unit is on mountain foot slopes. Elevation is 2,100 to 3,600 feet. The average annual precipitation is about 32 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is about 90 days.

This unit is about 50 percent Pend Oreille silt loam, 5 to 30 percent slopes, and 20 percent Hoodoo silt loam, 0 to 2 percent slopes. The remaining 30 percent is included soils. The Pend Oreille soil is in the higher areas and the Hoodoo soil is in swales and depressional areas. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Treble gravelly sandy loam and Dufort silt loam on rolling to steep foot slopes; Bonner gravelly silt loam in benchlike areas; Pywell muck, undrained, in wet swales and depressional areas; and Sagle silt loam in concave bowllike areas on toe slopes.

The Pend Oreille soil is very deep and well drained. It formed in glacial till derived dominantly from granitic and metamorphic rock and has a mantle of volcanic ash and loess. Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is light yellowish brown, neutral silt loam about 4 inches thick. The subsoil is light yellowish brown, slightly acid silt loam and loam about 13 inches thick. The next layer is pale brown, medium acid and slightly acid gravelly sandy loam about 24 inches thick. The substratum to a depth of 60 inches or more is very pale brown, slightly acid very cobbly sandy loam.

Permeability of this Pend Oreille soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Runoff is medium to rapid, and the hazard of water erosion is high to very high.

The Hoodoo soil is very deep and poorly drained. It formed in alluvium derived dominantly from volcanic ash. Typically, the surface layer is dark grayish brown and light brownish gray, neutral silt loam about 15 inches thick. The upper 37 inches of the underlying material is mottled, white and light gray, neutral and slightly acid silt loam and very fine sandy loam, and the lower part to a depth of more than 60 inches is mottled, light gray, medium acid very cobbly silty clay loam and extremely gravelly silt loam.

Permeability of this Hoodoo soil is moderate to a depth of about 52 inches and moderately slow below this depth. Effective rooting depth is limited by a seasonal

high water table that is at a depth of 12 to 24 inches from February to June. Available water capacity is high. Runoff is very slow to slow, and the hazard of water erosion is none to slight. This soil is subject to very long periods of flooding late in winter and in spring.

This unit is used mainly for timber production, livestock grazing, wildlife habitat, and recreation. It is also used for homesite development.

Cropland.—This unit is poorly suited to cultivated crops. It is limited mainly by cool soil temperatures, a short growing season, slope, and the hazard of water erosion.

*Woodland.*Western redcedar, western white pine, grand fir, and Douglas-fir are the main woodland species on the Pend Oreille soil. Among the trees of limited extent are western larch, ponderosa pine, and lodgepole pine. On the basis of a 50-year site curve, the average site index is 75 for grand fir and 70 for western white pine. On the basis of a 100-year site curve, the average site index for Douglas-fir is 115. Yield tables indicate that the maximum average annual growth is 144 cubic feet per acre of grand fir at 103 years of age, 135 cubic feet per acre of western white pine at 105 years of age, and 132 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are the hazard of water erosion and the susceptibility of the soil to compaction. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

The Hoodoo soil is not used as woodland. Road construction and hauling on this soil is limited by seasonal wetness. The native vegetation on the soil is mainly grass, sedge, rush, willow, red alder, and some poplar, black cottonwood, and paper birch.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,000 pounds of air-dry vegetation per acre to less than 50 pounds per acre as the canopy closes.

Recreation.—This unit is poorly suited to recreational development. The main limitations are the hazard of flooding and wetness in spring of the Hoodoo soil and the hazard of water erosion and slope of the Pend Oreille soil. Drainage should be provided for paths and trails. Cuts and fills should be seeded or mulched. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by limiting traffic. Protection from flooding is needed on the Hoodoo soil.

Homesite development.—This unit is poorly suited to homesite development. The main limitations are slope and the hazard of erosion on the Pend Oreille soil and the hazard of flooding, wetness, and frost heaving on the Hoodoo soil. Included in this unit, however, are areas of soil that are better suited to homesite development. Onsite investigation is required to identify these areas.

This map unit is in capability subclass VIe. The Pend Oreille soil is in woodland suitability subclass 1o.

37—Pend Oreille-Rock outcrop complex, 5 to 45 percent slopes. This map unit is on foothills and north-facing mountainsides. Elevation is 2,100 to 3,600 feet. The average annual precipitation is about 32 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is about 90 days.

This unit is about 45 percent Pend Oreille silt loam and 25 percent Rock outcrop. The remaining 30 percent is included soils. The Pend Oreille soil is on plane or concave side slopes and Rock outcrop is on or near ridges and knobs. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Vay silt loam and Ardtoo gravelly loam near ridges on mountainsides; Dufort silt loam on rolling to steep, east- and west-facing side slopes; and Treble gravelly sandy loam on south-facing side slopes. Also included are small areas of Sagle silt loam in concave, bowllike areas and Hoodoo silt loam in wet depressional areas.

The Pend Oreille soil is very deep and well drained. It formed in glacial till derived dominantly from granitic and metamorphic rock and has a mantle of volcanic ash and loess. Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is light yellowish brown, neutral silt loam about 4 inches thick. The subsoil is light yellowish brown, slightly acid silt loam and loam about 13 inches thick. The next layer is pale brown, medium acid and slightly acid gravelly sandy loam about 24 inches thick. The substratum to a depth of 60 inches or more is very pale brown, slightly acid very cobbly sandy loam.

Permeability of this Pend Oreille soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Runoff is medium to very rapid, and the hazard of water erosion is high to very high.

Rock outcrop consists of areas of exposed granite, gneiss, or schist that is hard and is fractured in places as a result of weathering. Some soil material is in the

cracks and crevices. Areas of Rock outcrop are not suitable for most land uses.

This unit is used mainly for timber production, livestock grazing, wildlife habitat, and recreation. It is also used for homesite development.

Woodland.—Western redcedar, western white pine, grand fir, and Douglas-fir are the main woodland species on the Pend Oreille soil. Among the trees of limited extent are western larch, ponderosa pine, and lodgepole pine. On the basis of a 50-year site curve, the average site index is 75 for grand fir and 70 for western white pine. On the basis of a 100-year site curve, the average site index for Douglas-fir is 115. Yield tables indicate that the maximum average annual growth is 144 cubic feet per acre of grand fir at 103 years of age, 135 cubic feet per acre of western white pine at 105 years of age, and 132 cubic feet per acre of Douglas-fir at 40 years of age. The areas of Rock outcrop in this unit will reduce yield about 25 percent.

The main limitations for the harvesting of timber are slope, the hazard of water erosion, susceptibility of the soil to compaction, and the areas of Rock outcrop. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding disturbs the soil less. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction. The areas of Rock outcrop may cause breakage of timber and hinder yarding.

Plant competition and the areas of Rock outcrop are the main concerns in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration. The areas of Rock outcrop limit the even distribution of naturally regenerated tree seedlings.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,500 pounds of air-dry vegetation per acre to less than 50 pounds per acre as the canopy closes. The production of forage is limited by the areas of Rock outcrop, which generally interfere with movement of livestock and accessibility of forage.

Recreation.—Most areas of this unit are poorly suited to recreational development because of slope. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as recreational sites. If this unit is used for recreational development, the main limitations are slope, the areas of Rock outcrop, dustiness, and the hazard of water erosion. Cuts and fills should be seeded or mulched. Areas used for recreation can be protected from soil blowing and dust by maintaining adequate plant cover.

Homesite development.—Most areas of this unit are poorly suited to homesite development. The main limitations are slope and the areas of Rock outcrop. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as homesites. Onsite investigation is required to identify these areas.

This map unit is in capability subclass VIIs and in woodland suitability subclass 1x.

38—Priestlake gravelly sandy loam, 15 to 35 percent slopes. This very deep, well drained soil is on mountainsides and foot slopes. It formed in glacial till derived dominantly from granite, gneiss, and schist and has a mantle of loess and volcanic ash. Elevation is 2,400 to 4,000 feet. The average annual precipitation is about 38 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 75 days.

Typically, the surface is covered with a mat of needles, leaves, twigs, and moss about 1.5 inches thick. The surface layer is light yellowish brown, slightly acid gravelly sandy loam about 12 inches thick. The upper 11 inches of the subsoil is very pale brown, slightly acid very gravelly sandy loam, and the lower 37 inches or more is very pale brown and white, medium acid and slightly acid very gravelly loamy sand and extremely cobbly loamy sand.

Permeability of the Priestlake soil is moderately rapid to a depth of about 23 inches and rapid to very rapid below this depth. Effective rooting depth is 60 inches or more. Available water capacity is low. Runoff is rapid, and the hazard of water erosion is high.

Included in this unit are small areas of Treble gravelly sandy loam, high precipitation, on mountainsides that have southerly aspects; Pend Oreille silt loam in the less sloping, benchlike areas; Jeru very stony sandy loam, warm, on foot slopes; and Klootch gravelly sandy loam on ridges and in the higher lying areas. Also included are small areas of soils that are similar to this Priestlake soil but are somewhat poorly drained and are in swales and concave areas or have dense, compact substratum and are in the higher lying areas.

This unit is used mainly for timber production, wildlife habitat, and recreation. It is also used for limited livestock grazing in some areas and as sites for summer cabins and homes.

Woodland.—Western hemlock, western redcedar, western white pine, and grand fir are the main woodland species on this unit. Among the trees of limited extent are Douglas-fir and western larch. On the basis of a 50-year site curve, the average site index is 70 for western white pine and 60 for grand fir. Yield tables indicate that the maximum average annual growth is 135 cubic feet

per acre of western white pine at 105 years of age and 118 cubic feet per acre of grand fir at 105 years of age.

The main limitations for the harvesting of timber are the susceptibility of cutbanks to slumping and the instability of roadways. The soil is subject to slumping especially if road cuts are made in the steeper areas. Locating roads in the more gently sloping areas and using adequate drainage systems reduce maintenance costs.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,200 pounds of air-dry vegetation per acre to less than 50 pounds per acre as the canopy closes.

Recreation.—Most areas of this unit are poorly suited to recreational development because of slope. Steepness of slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as recreational sites. Cuts and fills on this unit should be seeded or mulched.

Homesite development.—Most areas of this unit are poorly suited to homesite development. The main limitations are slope and the hazard of soil slippage. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as homesites. Onsite investigation is required to identify these areas.

This map unit is in capability subclass VIe and in woodland suitability subclass 1f.

39—Priestlake gravelly sandy loam, 35 to 65 percent slopes. This very deep, well drained soil is on mountainsides. It formed in glacial till derived dominantly from granite, gneiss, and schist and has a mantle of loess and volcanic ash. Elevation is 2,400 to 5,000 feet. The average annual precipitation is about 38 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 75 days.

Typically, the surface is covered with a mat of needles, leaves, twigs, and moss about 1.5 inches thick. The surface layer is light yellowish brown, slightly acid gravelly sandy loam about 12 inches thick. The upper 11 inches of the subsoil is very pale brown, slightly acid very gravelly sandy loam, and the lower 37 inches or more is very pale brown and white, medium acid and slightly acid very gravelly loamy sand and extremely cobbly loamy sand.

Permeability of the Priestlake soil is moderately rapid to a depth of about 23 inches and rapid to very rapid below this depth. Effective rooting depth is 60 inches or more. Available water capacity is low. Runoff is very rapid, and the hazard of water erosion is very high.

Included in this unit are small areas of Treble gravelly sandy loam, high precipitation, on south-facing mountainsides; Pend Oreille silt loam in the less sloping areas; Jeru very stony sandy loam, warm, in concave areas and on foot slopes; and Klootch gravelly sandy loam on ridges and in the higher lying areas. Also included are small areas of soils that are similar to this Priestlake soil but have a dense, compact substratum and are in the higher lying areas or are somewhat poorly drained and are in swales and concave areas.

Most areas of this unit are used for timber production, wildlife habitat, recreation, and watershed. Some areas are used for limited livestock grazing, and a few areas are used as sites for summer cabins and homes.

Woodland.—Western hemlock, western redcedar, western white pine, and grand fir are the main woodland species on this unit. Among the trees of limited extent are Douglas-fir and western larch. On the basis of a 50-year site curve, the average site index is 70 for western white pine and 60 for grand fir. Yield tables indicate that the maximum average annual growth is 135 cubic feet per acre of western white pine at 105 years of age and 118 cubic feet per acre of grand fir at 105 years of age.

The main limitations for the harvesting of timber are slope, the hazard of water erosion, susceptibility of cutbanks to slumping, and instability of roadways. When harvesting timber, steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. The soil in this unit is subject to slumping, especially if road cuts are made in the steeper areas. Locating roads in the more gently sloping areas and using adequate drainage systems reduce maintenance costs.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,200 pounds of air-dry vegetation per acre to less than 50 pounds per acre as the canopy closes. Slope may create livestock distribution problems.

Recreation.—This unit is poorly suited to recreational development. Slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. The main limitations are slope and the hazard of soil slippage.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

This map unit is in capability subclass VIIe and in woodland suitability subclass 1f.

40—Prouty gravelly loam, 35 to 65 percent slopes. This moderately deep, well drained soil is on mountainsides. It formed in material derived dominantly from granite, gneiss, and schist and has a mantle of volcanic ash and loess. Elevation is 5,000 to 6,400 feet. The average annual precipitation is about 50 inches, the average annual air temperature is about 40 degrees F, and the average frost-free period is about 45 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1.5 inches thick. The surface layer is yellowish brown, strongly acid gravelly loam about 6 inches thick. The upper 12 inches of the subsoil is yellowish brown, strongly acid gravelly loam, and the lower 6 inches is light yellowish brown, strongly acid extremely stony sandy loam. The substratum is light gray, strongly acid extremely stony sandy loam about 13 inches thick. Fractured and weathered granite is at a depth of about 37 inches.

Permeability of this Prouty soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is low. Runoff is very rapid, and the hazard of water erosion is very high.

Included in this unit are small areas of Jeru very stony loam on mountainsides, Brickel stony loam at the higher elevations on ridgetops, Hun gravelly silt loam on mountainsides, and Vay silt loam at the lower elevations on mountainsides. Also included are small areas of Rock outcrop and Rubble land.

This unit is used mainly for timber production, recreation, wildlife habitat, and watershed. A few areas are used for limited livestock grazing.

Woodland.—Subalpine fir, Engelmann spruce, and western white pine are the main woodland species on this unit. On the basis of a 100-year site curve, the average site index for subalpine fir is 60. Yield tables indicate that the maximum average annual growth of subalpine fir at 125 years of age is 50 cubic feet per acre.

The main limitations for the harvesting of timber are slope and the hazard of water erosion. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration. The mortality of seedlings is higher on ridgetops that are subject to strong, persistent winds than in other areas of this unit.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,200 pounds of air-dry vegetation per acre to less than 200 pounds per acre as the canopy closes. Slope may create livestock distribution problems.

Recreation.—This unit is poorly suited to recreational development. Steepness of slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. It is limited mainly by slope.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

This map unit is in capability subclass VIIe and in woodland suitability subclass 4f.

41—Pywell muck, 0 to 1 percent slopes. This very deep, very poorly drained organic soil is in depressional areas on drainageways, flood plains, and bottom lands. It formed in organic material derived dominantly from herbaceous plants but including some woody material. Elevation is 2,050 to 3,000 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is about 90 days.

Typically, the surface layer is highly decomposed, very dark gray and black, slightly acid and neutral organic material about 15 inches thick. The upper 27 inches of the underlying material is highly decomposed, mottled, dark reddish brown and black, slightly acid and medium acid organic material, and the lower part to a depth of 60 inches or more is moderately decomposed, dark reddish brown, medium acid organic material.

Permeability of this Pywell soil is moderate. Effective rooting depth is limited by a seasonal high water table that is at a depth of 0 to 4 feet from January to December. Available water capacity is very high. Runoff is very slow, and the hazard of water erosion is none. This soil is subject to very long periods of flooding in winter and spring.

Included in this unit are small areas of Hoodoo silt loam in the slightly higher lying areas on flood plains and bottom lands, Wrencoe silty clay on low stream terraces of flood plains and bottom lands, and Capehorn silt loam in the slightly higher lying areas of small valley bottoms and flood plains.

Areas of this unit that are adequately drained are used for crop production. This unit is also used for hay and pasture, livestock grazing, and wildlife habitat.

Cropland.—If this unit is used for nonirrigated small grain, the main limitations are seasonal wetness, the hazard of flooding in spring, cool soil temperatures, and a short growing season. Most climatically adapted crops can be grown if artificial drainage is provided. The risk of flooding can be reduced by the use of dikes, levees, and diversions.

Hay and pasture.—This unit is suited to hay and pasture. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Among the adapted improved forage plants are reed canarygrass, timothy, meadow foxtail, and clover.

Livestock grazing.—This unit can produce forage for livestock and big game animals continuously. The average annual production of air-dry vegetation ranges from 6,000 pounds per acre in favorable years to 4,000 pounds per acre in unfavorable years. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

Recreation.—This unit is poorly suited to recreational development. It is limited mainly by excess humus, the hazard of flooding, wetness, and low soil strength.

Homesite development.—This unit is poorly suited to homesite development. The main limitations are the hazard of flooding, seasonal wetness, excess humus, and a hazard of frost heaving.

This map unit is in capability subclass IVw.

42—Pywell-Hoodoo complex, 0 to 1 percent slopes. This map unit is in basins on flood plains and bottom lands. Elevation is 2,050 to 3,000 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is about 90 days.

This unit is about 40 percent Pywell muck and 35 percent Hoodoo silt loam. The remaining 25 percent is included soils. The Pywell soil is in the slightly lower depressional areas, and the Hoodoo soil is on the slightly higher rims of basins. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Rathdrum silt loam in the slightly higher areas, Wrencoe silty clay on low stream terraces, Bonner gravelly silt loam on the higher outwash terraces, and Capehorn silt loam on small valley bottoms and flood plains.

The Pywell soil is very deep and very poorly drained. It formed in organic material derived dominantly from herbaceous plants but including some woody material. Typically, the surface layer is highly decomposed, very dark gray and black, slightly acid and neutral organic material about 15 inches thick. The upper 27 inches of the underlying material is highly decomposed, mottled, dark reddish brown and black, slightly acid and medium acid organic material, and the lower part to a depth of 60 inches or more is moderately decomposed, dark reddish brown, medium acid organic material.

Permeability of the Pywell soil is moderate. Effective rooting depth is limited by a seasonal high water table that is at a depth of 0 to 4 feet from January to December. Available water capacity is very high. Runoff is very slow, and the hazard of water erosion is none. This soil is subject to very long periods of flooding in winter and spring.

The Hoodoo soil is very deep and poorly drained. It formed in alluvium derived dominantly from volcanic ash. Typically, the surface layer is dark grayish brown and light brownish gray, neutral silt loam about 15 inches thick. The upper 37 inches of the underlying material is mottled, white and light gray, neutral and slightly acid silt loam and very fine sandy loam, and the lower part to a depth of 60 inches or more is mottled, light gray and yellowish brown, medium acid, very cobbly silty clay loam and extremely gravelly silt loam.

Permeability of the Hoodoo soil is moderate to a depth of about 52 inches and moderately slow below this depth. Effective rooting depth is limited by a seasonal high water table that is at a depth of 12 to 24 inches from February to June. Available water capacity is high. Runoff is very slow, and the hazard of water erosion is slight. This soil is subject to very long periods of flooding late in winter and in spring.

Areas of this unit in areas that are adequately drained are used for crop production. The unit is also used for hay and pasture, livestock grazing, and wildlife habitat.

Cropland.—If this unit is used for small grain crops, the main limitations are wetness, the hazard of flooding in spring, cool soil temperatures, and a short growing season. Most climatically adapted crops can be grown if artificial drainage is provided. The risk of flooding can be reduced by the use of dikes, levees, and diversions.

Hay and pasture.—This unit is suited to hay and pasture. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Among the adapted improved forage plants are reed canarygrass, timothy, meadow foxtail, and clover.

Livestock grazing.—This unit can produce forage for livestock and big game animals continuously. The average annual production of air-dry vegetation ranges from 6,000 pounds per acre in favorable years to 3,000 pounds per acre in unfavorable years. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

Recreation.—This unit is poorly suited to recreational development. The main limitations are the hazard of flooding, wetness, excess humus, and low soil strength. Drainage should be provided for paths and trails. Protection from flooding is needed.

Homesite development.—This unit is poorly suited to homesite development. The main limitations are the hazard of flooding, wetness, a hazard of frost heaving, and excess humus. Buildings and roads should be designed to offset the effects of flooding, the high water table, frost heaving, and excess humus. Septic tank absorption fields do not function properly late in winter and in spring.

This map unit is in capability subclass IVw.

43—Rathdrum silt loam, 0 to 2 percent slopes. This very deep, well drained soil is in swales and depressional areas of glacial outwash terraces. It formed

in alluvium derived dominantly from volcanic ash. Elevation is 2,100 to 2,600 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 100 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is light yellowish brown, slightly acid silt loam about 17 inches thick. The subsoil is pale brown, slightly acid silt loam about 21 inches thick. The substratum to a depth of 60 inches or more is pale brown and very pale brown, slightly acid silt loam.

Permeability of this Rathdrum soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is slow, and the hazard of water erosion is slight.

Included in this unit are small areas of Bonner gravelly silt loam in the higher areas on terraces; Kootenai gravelly silt loam on knolls and ridges, Hoodoo silt loam on wet bottom lands and in depressional areas, and Kaniksu sandy loam in the higher areas on terraces.

This unit is used mainly for timber production, crop production, and hay and pasture (fig. 8). It is also used for livestock grazing, wildlife habitat, homesite development, and recreation.

Cropland.—This unit is well suited to small grain. It is limited mainly by cool soil temperatures.

Hay and pasture.—This unit is suited to hay and pasture. If a high level of management is used, yields are good in irrigated areas and fair in nonirrigated areas. The main limitation is cool soil temperatures. Among the adapted improved forage plants are orchardgrass, smooth brome, tall fescue, clover, and alfalfa.

Woodland.—Western red cedar, western white pine, grand fir, and Douglas-fir are the main woodland species on this unit. Among the trees of limited extent are

Figure 8.—Typical area of Rathdrum silt loam, 0 to 2 percent slopes, used for hay and pasture.

ponderosa pine, western larch, and lodgepole pine. On the basis of a 50-year site curve, the average site index is 70 for western white pine and 65 for grand fir. On the basis of a 100-year site curve, the average site index for Douglas-fir is 115. Yield tables indicate that the maximum average annual growth is 135 cubic feet per acre of western white pine at 105 years of age, 127 cubic feet per acre of grand fir at 105 years of age, and 132 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitation for the harvesting of timber is the susceptibility of the soil to compaction. Use of wheeled and tracked equipment when the soil is moist causes ruts; compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,200 pounds of air-dry vegetation per acre to less than 250 pounds per acre as the canopy closes.

Recreation.—This unit is suited to recreational development. It is limited mainly by dustiness. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover.

Homesite development.—This unit is well suited to homesite development. The main limitation is a hazard of frost heaving. Roads and buildings should be designed to offset the effects of frost heaving. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

This map unit is in capability subclass IIIc and in woodland suitability subclass 1o.

44—Rathdrum silt loam, cool, 0 to 8 percent slopes. This very deep, well drained, nearly level to undulating soil is in depressional areas on glacial outwash terraces. It formed in alluvium derived dominantly from volcanic ash. Elevation is 2,200 to 2,600 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 90 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is light yellowish brown, slightly acid silt loam about 17 inches thick. The subsoil is pale brown slightly acid silt loam about 21 inches thick. The substratum to a depth of 60 inches or more is pale brown and very pale brown, slightly acid silt loam.

Permeability of this Rathdrum soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is slow to medium, and the hazard of water erosion is slight to moderate.

Included in this unit are small areas of Bonner silt loam, cool, on the higher terraces; Hoodoo silt loam in depressional areas and on bottom lands; Selle fine sandy loam on dissected terraces; and Capehorn silt loam on low stream terraces.

This unit is used for timber production, livestock grazing, wildlife habitat, homesite development, and recreation.

Cropland.—This unit is poorly suited to cultivated crops. It is limited mainly by cool soil temperatures and a short growing season.

Woodland.—Western hemlock, western redcedar, western white pine, and grand fir are the main woodland species on this unit. Among the trees of limited extent are Douglas-fir, western larch, and lodgepole pine. On the basis of a 50-year site curve, the average site index is 75 for western white pine and 70 for grand fir. On the basis of a 100-year site curve, the average site index for Douglas-fir is 120. Yield tables indicate that the maximum average annual growth is 144 cubic feet per acre of western white pine at 103 years of age, 135 cubic feet per acre of grand fir at 105 years of age, and 141 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitation for the harvesting of timber is the susceptibility of the soil to compaction. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,200 pounds of air-dry vegetation per acre to less than 50 pounds per acre as the canopy closes.

Recreation.—This unit is suited to recreational development. It is limited mainly by dustiness. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover. Plant cover can be maintained by limiting traffic.

Homesite development.—This unit is well suited to homesite development. The main limitation is a hazard of frost heaving. Roads and buildings should be designed to offset the effects of frost heaving.

This map unit is in capability subclass IVe and in woodland suitability subclass 1o.

45—Rathdrum-Bonner silt loams, 0 to 8 percent slopes. This map unit is in nearly level to undulating depressional areas on glacial outwash terraces. Elevation is 2,100 to 2,600 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 100 days.

This unit is about 40 percent Rathdrum silt loam, 0 to 2 percent slopes, and 35 percent Bonner silt loam, 0 to 8 percent slopes. The remaining 25 percent is included soils. The Rathdrum soil is in the lower areas, and the Bonner soil is on the higher areas. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Kootenai gravelly silt loam on the higher knolls and ridges, Kaniksu sandy loam in the higher areas on terraces, Hoodoo silt loam in wet swales and on bottom lands, and Selle fine sandy loam on dissected terraces.

The Rathdrum soil is very deep and well drained. It formed in alluvium derived dominantly from volcanic ash. Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is light yellowish brown, slightly acid silt loam about 17 inches thick. The subsoil is pale brown, slightly acid silt loam about 21 inches thick. The substratum to a depth of 60 inches or more is pale brown and very pale brown, slightly acid silt loam.

Permeability of this Rathdrum soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Runoff is slow, and the hazard of water erosion is slight.

The Bonner soil is very deep and well drained. It formed in glacial outwash derived dominantly from granite, gneiss, and schist and has a mantle of volcanic ash and loess. Typically, the surface is covered with a mat of needles and twigs about 1.3 inches thick. The surface layer is pale brown, slightly acid silt loam about 5 inches thick. The subsoil is pale brown and very pale brown, slightly acid gravelly silt loam and gravelly sandy loam about 24 inches thick. The substratum to a depth of 60 inches or more is very pale brown, slightly acid and neutral very gravelly loamy sand.

Permeability of the Bonner soil is moderate to a depth of about 29 inches and rapid to very rapid below this depth. Effective rooting depth is limited to a depth of 20 to 40 inches by sand and gravel. Available water capacity is low. Runoff is slow to medium, and the hazard of water erosion is slight to moderate.

This unit is used mainly for timber production, cultivated crops production, and hay and pasture. It is also used for livestock grazing, wildlife habitat, homesite development, and recreation.

Cropland.—This unit is well suited to irrigated and nonirrigated small grain. It is limited mainly by cool soil temperatures.

Hay and pasture.—This unit is well suited to hay and pasture. If a high level of management is used, yields are good in irrigated areas and fair in nonirrigated areas. Among the adapted improved forage plants are orchardgrass, smooth brome, tall fescue, and alfalfa.

Woodland.—Western redcedar, western white pine, grand fir, and Douglas-fir are the main woodland species on the Rathdrum soil. Among the trees of limited extent are ponderosa pine, western larch, and lodgepole pine. On the basis of a 50-year site curve, the average site index is 70 for western white pine and 65 for grand fir. On the basis of a 100-year site curve, the average site index for Douglas-fir is 115. Yield tables indicate that the maximum average annual growth is 135 cubic feet per acre of western white pine at 105 years of age, 127 cubic feet per acre of grand fir at 105 years of age, and 132 cubic feet per acre of Douglas-fir at 40 years of age.

Grand fir, Douglas-fir, ponderosa pine, western larch, and lodgepole pine are the main woodland species on the Bonner soil. On the basis of a 50-year site curve, the average site index for grand fir is 60. On the basis of a 100-year site curve, the average site index for Douglas-fir is 110. Yield tables indicate that the maximum average annual growth is 118 cubic feet per acre of grand fir at 105 years of age and 122 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitation for the harvesting of timber is susceptibility of the soil to compaction. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,200 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes.

Recreation.—This unit is suited to recreational development. It is limited mainly by dustiness. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover.

Homesite development.—The Rathdrum soil is well suited to homesite development. The main limitation is a hazard of frost heaving.

The Bonner soil is suited to homesite development. The main limitations are a risk of seepage from septic tank absorption fields and a hazard of frost heaving. Specially designed waste disposal systems are needed. Roads and buildings should be designed to offset the

effects of frost heaving. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

This map unit is in capability subclasses IIIs, irrigated, and IVs, nonirrigated. The Rathdrum soil is in woodland suitability subclass 1o, and the Bonner soil is in 2o.

46—Rock outcrop-Rubble land complex. This map unit is on mountainsides. It is about 55 percent Rock outcrop and 40 percent Rubble land. The remaining 5 percent is included soils. Areas of this unit are near areas of the Brickel, Prouty, Jeru, Hun, Lenz, and Treble soils.

Rock outcrop consists of areas of exposed granite, gneiss, and schist. It is fractured in places, and some soil material is in the crevices.

Rubble land consists mainly of areas of large stones and boulders that support little vegetation except for lichens and a few stunted shrubs or trees growing between the rock fragments. Areas are commonly below the areas of Rock outcrop, but some areas have been deposited on mountainsides by glaciation.

Areas of this unit are not suitable for most land uses.

This map unit is in capability subclass VIIIs.

47—Sagle silt loam, 5 to 30 percent slopes. This very deep, somewhat poorly drained, rolling or hilly soil is on toe slopes and foot slopes. It formed in glacial till derived dominantly from granitic and metamorphic rock and has a mantle of volcanic ash and loess. Elevation is 2,200 to 3,000 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 100 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is yellowish brown, neutral silt loam about 11 inches thick. The upper 4 inches of the subsoil is light yellowish brown, medium acid silt loam, and the lower 6 inches is very pale brown, medium acid gravelly silt loam. The next layer to a depth of 60 inches or more is mottled, mixed very pale brown, white, and light gray, strongly acid very gravelly and extremely gravelly sandy loam.

Permeability of this Sagle soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is low to moderate. Runoff is rapid to very rapid, and the hazard of water erosion is high to very high. A seasonal high water table is at a depth of 2.0 to 3.5 feet late in winter and in spring.

Included in this unit are small areas of Dufort silt loam and Pend Oreille silt loam on mountainsides, Colburn very fine sandy loam and Bonner gravelly silt loam in level benchlike areas on toe slopes, Hoodoo silt loam in wet depressional areas, and Treble gravelly sandy loam on south-facing foot slopes.

This unit is used mainly for timber production, livestock grazing, wildlife habitat, and recreation. It is also used for homesite development and for hay and pasture.

Cropland.—This unit is poorly suited to cultivated crops. It is limited mainly by cool soil temperatures, a short growing season, slope, and the hazard of water erosion.

Hay and pasture.—This unit is suited to hay and pasture. Among the adapted improved forage plants are timothy, tall fescue, smooth brome, reed canarygrass, and clover.

Woodland.—Grand fir, Douglas-fir, ponderosa pine, western larch, and lodgepole pine are the main woodland species on this unit. On the basis of a 50-year site curve, the average site index for grand fir is 70. On the basis of a 100-year site curve, the average site index is 115 for Douglas-fir and 110 for ponderosa pine. Yield tables indicate that the maximum average annual growth is 135 cubic feet per acre of grand fir at 105 years of age, 132 cubic feet per acre of Douglas-fir at 40 years of age, and 122 cubic feet per acre of ponderosa pine at 40 years of age.

The main limitations for the harvesting of timber are seasonal wetness, the hazard of water erosion, and susceptibility of the soil to compaction. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction. If roads are constructed on this unit, slumping of cutbanks can be expected.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 20 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,800 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

Recreation.—This unit is marginally suited to recreational development. The main limitations are slope and dustiness. Drainage should be provided for paths and trails. Cuts and fills should be seeded or mulched. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover.

Homesite development.—This unit is marginally suited to homesite development. The main limitations are slope,

wetness, and a hazard of frost heaving. Roads and buildings should be designed to offset the effects of frost heaving and wetness. Septic tank absorption fields do not function properly late in winter and in spring. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Measures to control runoff and erosion are needed if the plant cover is disturbed or removed.

This map unit is in capability subclass VIe and in woodland suitability subclass 1w.

48—Selle fine sandy loam, 0 to 8 percent slopes. This very deep, well drained, nearly level to rolling soil is on terraces and dunes. It formed in sandy glacial lake-laid sediment that has been reworked by wind and has a thin mantle of loess and volcanic ash. Elevation is 2,050 to 2,500 feet. The average annual precipitation is about 33 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 110 days.

Typically, the surface is covered with a mat of needles and twigs about 3 inches thick. The surface layer is yellowish brown, medium acid fine sandy loam about 5 inches thick. The upper part of the subsoil is light yellowish brown, medium acid fine sandy loam about 15 inches thick, and the lower part to a depth of 60 inches or more is light yellowish brown, medium acid loamy fine sand.

Permeability of the Selle soil is moderately rapid to a depth of about 20 inches and rapid below this depth. Effective rooting depth is 60 inches or more. Available water capacity is low to moderate. Runoff is slow, and the hazard of water erosion is slight.

Included in this unit are small areas of Elmira loamy sand in the higher areas on dunes and terraces; Colburn very fine sandy loam on low alluvial terraces; Bonner silt loam, cool, in the higher areas on terraces; and Mission silt loam in the lower areas on terraces. Also included are small areas of Hoodoo silt loam and Pywell muck, in drainageways and on bottom lands.

This unit is used mainly for hay and pasture, timber production, wildlife habitat, and homesite development. It is also used for cultivated crops, livestock grazing, and recreation.

Cropland.—This unit is suited to irrigated and nonirrigated crops. It is limited mainly by cool soil temperatures. Because this unit is somewhat droughty, applications of irrigation water should be light and frequent.

Hay and pasture.—This unit is suited to hay and pasture. If a high level of management is used, yields are good in irrigated areas and fair in nonirrigated areas. Among the adapted improved forage plants are intermediate wheatgrass, smooth brome, tall fescue, orchardgrass, and alfalfa.

Woodland.—Western redcedar, western white pine, grand fir, and Douglas-fir are the main woodland species on this unit. Among the trees of limited extent are ponderosa pine, western larch, and lodgepole pine. On the basis of a 50-year site curve, the average site index for western white pine and grand fir is 75. On the basis of a 100-year site curve, the average site index is 115 for Douglas-fir and 105 for ponderosa pine. Yield tables indicate that the maximum average annual growth is 144 cubic feet per acre of western white pine and grand fir at 103 years of age, 132 cubic feet per acre of Douglas-fir at 40 years of age, and 112 cubic feet per acre of ponderosa pine at 40 years of age.

This unit has few limitations for harvesting timber. Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,500 pounds of air-dry vegetation per acre to less than 150 pounds per acre as the canopy closes.

Recreation.—This unit is well suited to recreational development. It has few limitations.

Homesite development.—This unit is suited to homesite development. The main limitation is the hazard of seepage from septic tank absorption fields, which can contaminate ground water. Specially designed waste disposal systems are needed.

This map unit is in capability subclass IIIs and in woodland suitability subclass 1o.

49—Selle-Elmira complex, 0 to 20 percent slopes. This map unit is in nearly level to hilly areas on terraces and dunes. Elevation is 2,050 to 2,500 feet.

This unit is about 55 percent Selle fine sandy loam, 0 to 8 percent slopes, and 30 percent Elmira loamy sand, 2 to 20 percent slopes. The remaining 15 percent is included soils. The Selle soil is in the lower areas on dunes and terraces, and the Elmira soil is in the higher areas on dunes and terraces. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Hoodoo silt loam in drainageways and on bottom lands, Colburn very fine sandy loam on low alluvial fans and terraces, Pywell muck in swales and depressional areas on terraces, and Mission silt loam on the lower terraces.

The Selle soil is very deep and well drained. It formed in sandy glacial lake-laid sediment that has been reworked by wind and has a thin mantle of loess and volcanic ash. The average annual precipitation is about 32 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 110 days.

Typically, the surface is covered with a mat of needles and twigs about 3 inches thick. The surface layer is

yellowish brown, medium acid fine sandy loam about 5 inches thick. The upper part of the subsoil is light yellowish brown, medium acid fine sandy loam about 15 inches thick, and the lower part to a depth of 60 inches or more is light yellowish brown, medium acid loamy fine sand.

Permeability of the Selle soil is moderately rapid to a depth of about 20 inches and rapid below this depth. Effective rooting depth is 60 inches or more. Available water capacity is low to moderate. Runoff is slow, and the hazard of water erosion is slight.

The Elmira soil is very deep and excessively drained. It formed in sandy glacial lake-laid sediment that has been reworked by wind. The average annual precipitation is about 32 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is about 115 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2.5 inches thick. The surface layer is brown, slightly acid loamy sand about 4 inches thick. The upper part of the subsoil is light yellowish brown, slightly acid loamy sand about 21 inches thick, and the lower part to a depth of 60 inches or more is light brownish gray and pale brown, slightly acid sand.

Permeability of this Elmira soil is rapid. Effective rooting depth is 60 inches or more. Available water capacity is low. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate.

This unit is used mainly for timber production, livestock grazing, wildlife habitat, and homesite development. It is also used for cultivated crops, hay and pasture, and recreation.

Cropland.—This unit is suited to irrigated crops and poorly suited to nonirrigated crops. It is limited mainly by droughtiness, slope, the cool temperatures of the Selle soil, and the hazard of soil blowing on the Elmira soil. Because these soils are droughty, applications of irrigation water should be light and frequent. Soil blowing can be reduced by returning crop residue to the soil and practicing minimum tillage.

Hay and pasture.—This unit is suited to hay and pasture. If a high level of management is used, yields are fair in irrigated areas and poor in nonirrigated areas. Among the adapted improved forage plants are tall fescue, orchardgrass, smooth brome, alfalfa, and clover.

Woodland.—Western redcedar, western white pine, grand fir, and Douglas-fir are the main woodland species on the Selle soil. Among the trees of limited extent are ponderosa pine, western larch, and lodgepole pine. On the basis of a 50-year site curve, the average site index for western white pine and grand fir is 75. On the basis of a 100-year site curve, the average site index is 115 for Douglas-fir and 105 for ponderosa pine. Yield tables indicate that the maximum average annual growth is 144 cubic feet per acre of western white pine and grand fir at 103 years of age, 132 cubic feet per acre of Douglas-fir at 40 years of age, and 112 cubic feet per acre of ponderosa pine at 40 years of age.

This unit has few limitations for harvesting timber. Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Ponderosa pine and Douglas-fir are the main woodland species on the Elmira soil. Among the trees of limited extent are western larch and lodgepole pine. On the basis of a 100-year site curve, the average site index for ponderosa pine and Douglas-fir is 115. Yield tables indicate that the maximum average annual growth is 132 cubic feet per acre for ponderosa pine and Douglas-fir at 40 years of age.

The loose sandy texture of the surface layer hinders the use of wheeled equipment, especially when the soil is dry. If seed trees are present, natural tree regeneration of cutover areas by ponderosa pine and Douglas-fir is adequate to produce a good stand of trees.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,500 pounds of air-dry vegetation per acre to less than 150 pounds per acre as the canopy closes.

Recreation.—This unit is suited to recreational development. It is limited mainly by slope and on the Elmira soil, the hazard of soil blowing. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover.

Homesite development.—This unit is suited to homesite development. The main limitations are the hazard of seepage from septic tank absorption fields, and slope. Specially designed waste disposal systems are needed. Topsoil needs to be added to establish plantings. Plans for homesite development should provide for the preservation of as many trees as possible. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

This map unit is in capability subclasses IVe, irrigated and nonirrigated. The Selle soil is in woodland suitability subclass 1o, and the Elmira soil is in 1s.

50—Selle-Mission complex, 0 to 12 percent slopes. This map unit is in nearly level to rolling areas on terraces and dunes. Elevation is 2,100 to 2,250 feet. The average annual precipitation is about 32 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 110 days.

This unit is about 50 percent Selle fine sandy loam, 2 to 12 percent slopes, and 30 percent Mission silt loam, 0 to 2 percent slopes. The remaining 20 percent is included soils. The Selle soil is on dunes on terraces,

and the Mission soil is in the lower areas on terraces. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Colburn very fine sandy loam at the base of dunes, Elmira loamy sand in the steeper areas on dunes, Odenson silt loam in the lower areas, and Hoodoo silt loam in depressional areas and drainageways.

The Selle soil is very deep and well drained. It formed in sandy glacial lake-laid sediment that has been reworked by wind and has a thin mantle of loess and volcanic ash. Typically, the surface is covered with a mat of needles, leaves, and twigs about 3 inches thick. The surface layer is yellowish brown, medium acid fine sandy loam about 5 inches thick. The upper part of the subsoil is light yellowish brown, medium acid fine sandy loam about 15 inches thick, and the lower part to a depth of 60 inches or more is light yellowish brown, medium acid loamy fine sand.

Permeability of the Selle soil is moderately rapid to a depth of about 20 inches and rapid below this depth. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Runoff is slow to medium, and the hazard of water erosion is slight to moderate.

The Mission soil is shallow to a hardpan and is somewhat poorly drained. It formed in silty glacial lake-laid sediment derived from mixed sources and has a mantle of volcanic ash and loess. Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is grayish brown, neutral silt loam about 2 inches thick. The upper part of the subsoil is yellowish brown, slightly acid silt loam about 9 inches thick, and the lower part is mottled, light gray and pale brown, medium acid, dense silt loam about 9 inches thick. The next layer is mottled, light gray, medium acid silt about 12 inches thick. The next layer is a buried subsoil of light yellowish brown and pale yellow, strongly acid silt loam and silty clay loam about 15 inches thick. The substratum to a depth of 60 inches or more is pale yellow and light yellowish brown, strongly acid and slightly acid, stratified very fine sandy loam and fine sand.

Permeability of this Mission soil is very slow in the hardpan. Effective rooting depth is limited to a depth of 10 to 20 inches by the hardpan. Available water capacity is moderate. Runoff is slow, and the hazard of water erosion is slight. Water is perched above the hardpan late in winter and in spring.

This unit is used mainly for hay and pasture, cultivated crops, and homesite development. It is also used for timber production, livestock grazing, and wildlife habitat.

Cropland.—This unit is moderately suited to nonirrigated small grain. It is limited mainly by the hazard of water erosion, cool soil temperatures, depth to the hardpan, restricted rooting depth, very slow permeability, and the perched water table in the Mission soil. Subsoiling increases the effective rooting depth. The water table that builds up in the Mission soil during the rainy period in spring generally limits the suitability of this unit for deep-rooted crops.

Hay and pasture.—This unit is suited to hay and pasture. If a high level of management is used, yields are good in irrigated areas and fair in nonirrigated areas. The main limitations are depth to the hardpan and the perched water table in the Mission soil in spring. Subsoiling increases the effective rooting depth. Grazing when the soil is moist results in compaction of the surface layer, poor tilth, and excessive runoff. Among the adapted improved forage plants are smooth brome, orchardgrass, and clover.

*Woodland.*Western redcedar, western white pine, grand fir, and Douglas-fir are the main woodland species on the Selle soil. Among the trees of limited extent are ponderosa pine, western larch, and lodgepole pine. On the basis of a 50-year site curve, the average site index for western white pine and grand fir is 75. On the basis of a 100-year site curve, the average site index is 115 for Douglas-fir and 105 for ponderosa pine. Yield tables indicate that the maximum average annual growth is 144 cubic feet per acre of western white pine and grand fir at 103 years of age, 132 cubic feet per acre of Douglas-fir at 40 years of age, and 112 cubic feet per acre of ponderosa pine at 40 years of age.

This soil has few limitations for harvesting timber. Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Western redcedar, western white pine, grand fir, and Douglas-fir are the main woodland species on the Mission soil. Among the trees of limited extent are western larch and ponderosa pine. On the basis of a 50-year site curve, the average site index for western white pine and grand fir is 85. On the basis of a 100-year site curve, the average site index for Douglas-fir is 120. Yield tables indicate that the maximum average annual growth is 163 cubic feet per acre of western white pine and grand fir at 100 years of age and 141 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations of this soil for the harvesting of timber are seasonal wetness and the susceptiblity of the soil to compaction. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction.

Plant competition and the hazard of windthrow are the main concerns in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration. Because the rooting depth is restricted by the hardpan, trees are subject to windthrow.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,500 pounds of air-dry vegetation per acre to less than 50 pounds per acre as the canopy closes.

Recreation.—This unit is suited to recreational development. The main limitation is the wetness of the Mission soil in spring. Drainage should be provided for paths and trails.

Homesite development.—This unit is moderately suited to homesite development. The main limitations are the hazard of seepage from septic tank absorption fields in the Selle soil and the wetness, very slow permeability, and the hazard of frost heaving of the Mission soil. Septic tank filter fields should be designed to offset the effects of seepage on the Selle soil and the wetness and very slow permeability of the Mission soil. Absorption lines should be placed below the very slowly permeable layer in the Mission soil. Increasing the size of the absorption area helps to compensate for the very slow permeability. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Buildings and roads should be designed to offset the effects of frost heaving and the perched water table.

This map unit is in capability subclass IVe, irrigated and nonirrigated. The Selle soil is in woodland suitability subclass 1o, and the Mission soil is in 1d.

51—Treble gravelly sandy loam, 5 to 20 percent slopes. This very deep, well drained, rolling to hilly soil is on foot slopes and foothills. It formed in glacial till derived dominantly from granite, gneiss, and schist and has a thin mantle of loess and volcanic ash. Elevation is 2,200 to 3,200 feet. The average annual precipitation is about 28 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is about 110 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 0.75 inch thick. The surface layer is dark grayish brown, slightly acid gravelly sandy loam about 2 inches thick. The upper 5 inches of the subsoil is yellowish brown, slightly acid gravelly sandy loam, and the lower 20 inches is light yellowish brown, medium acid very gravelly coarse sandy loam. The substratum to a depth of 60 inches or more is variegated, medium acid very gravelly loamy coarse sand.

Permeability of this Treble soil is moderately rapid to a depth of about 27 inches and moderately rapid to rapid below this depth. Effective rooting depth is 60 inches or more. Available water capacity is very low to low. Runoff is medium, and the hazard of water erosion is moderate.

Included in this unit are small areas of Bonner gravelly silt loam in the more nearly level areas on outwash terraces, Dufort silt loam on east- and west-facing side slopes and in concave areas, Pend Oreille silt loam on north-facing side slopes and in concave areas, and Kootenai gravelly silt loam in the more nearly level areas on outwash terraces.

This unit is used mainly for timber production, livestock grazing, wildlife habitat, and recreation. It is also used as homesites.

Cropland.—This unit is poorly suited to cultivated crops. It is limited mainly by droughtiness and slope.

Woodland.—Douglas-fir and ponderosa pine are the main woodland species on this unit. Among the trees of limited extent are western larch and lodgepole pine. On the basis of a 100-year site curve, the average site index for Douglas-fir and ponderosa pine is 105. Yield tables indicate that the maximum average annual growth is 112 cubic feet per acre for Douglas-fir and ponderosa pine at 40 years of age.

This unit has few limitations for harvesting timber. The seedling mortality rate may be high in summer because of the lack of adequate moisture in the soil.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 15 to 25 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,300 pounds of air-dry vegetation per acre to less than 500 pounds per acre as the canopy closes. If the shrubs on this unit are managed to create open areas, the unit produces a good stand of desirable grasses and forbs.

Recreation.—Most areas of this unit are suited to recreational development. Included in the unit, however, are areas of steeper soils that are less suitable for use as recreational sites. Cuts and fills on this unit should be seeded or mulched. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by limiting traffic.

Homesite development.—This unit is moderately suited to homesite development. The main limitations are slope and a hazard of seepage from septic tank absorption fields. Specially designed waste disposal systems are needed. Topsoil can be stockpiled and used to reclaim areas of this unit disturbed during construction. Measures to control runoff and erosion are needed if the plant cover is disturbed or removed. Roads and buildings should be designed to conform to the landscape. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

This map unit is in capability subclass VIe and in woodland suitability subclass 2f.

52—Treble gravelly sandy loam, 20 to 55 percent slopes. This very deep, well drained soil is on mountainsides and foothills. It formed in glacial till derived dominantly from granite, gneiss, and schist and has a thin mantle of loess and volcanic ash. Elevation is 2,200 to 3,600 feet. The average annual precipitation is

about 28 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is about 110 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 0.75 inch thick. The surface layer is dark grayish brown, slightly acid gravelly sandy loam about 2 inches thick. The upper 5 inches of the subsoil is yellowish brown, slightly acid gravelly sandy loam, and the lower 20 inches is light yellowish brown, medium acid very gravelly coarse sandy loam. The substratum to a depth of 60 inches or more is variegated, medium acid very gravelly loamy coarse sand.

Permeability of this Treble soil is moderately rapid to a depth of about 27 inches and moderately rapid to rapid below this depth. Effective rooting depth is 60 inches or more. Available water capacity is very low to low. Runoff is rapid to very rapid, and the hazard of water erosion is high to very high.

Included in this unit are small areas of Dufort silt loam on east- and west-facing side slopes and in concave areas, Pend Oreille silt loam on north-facing side slopes and in concave areas, Lenz stony sandy loam on ridges, and Ardtoo gravelly sandy loam on east- and west-facing side slopes.

Most areas of this unit are used for timber production, livestock grazing, wildlife habitat, and recreation. A few areas are used for homesite development.

Woodland.—Douglas-fir and ponderosa pine are the main woodland species on this unit. Among the trees of limited extent are western larch and lodgepole pine. On the basis of a 100-year site curve, the average site index for Douglas-fir and ponderosa pine is 105. Yield tables indicate that the maximum average annual growth is 112 cubic feet per acre of Douglas-fir and ponderosa pine at 40 years of age.

The main limitations for the harvesting of timber are slope and the hazard of water erosion. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Wheeled and tracked equipment can be used in the more gently sloping areas. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. If roads are constructed on this unit, slumping of cutbanks can be expected. The seedling mortality rate may be high in summer because of the lack of adequate moisture in the soil.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 15 to 25 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,300 pounds of air-dry vegetation per acre to less than 500 pounds per acre as the canopy closes. If the shrubs on this unit are managed to create open areas, the unit produces a good stand of desirable grasses and forbs. Slope may create livestock distribution problems.

Recreation.—This unit is poorly suited to recreational development. Steepness of slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. The main limitation is slope.

This map unit is in capability subclass VIIe and in woodland suitability subclass 2f.

53—Treble gravelly sandy loam, high precipitation, 15 to 35 percent slopes. This very deep, well drained soil is on south-facing mountain foot slopes. It formed in glacial till derived dominantly from granite, gneiss, and schist and has a thin mantle of loess and volcanic ash. Elevation is 2,500 to 3,600 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is about 90 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 0.75 inch thick. The surface layer is dark grayish brown, slightly acid gravelly sandy loam about 2 inches thick. The upper 5 inches of the subsoil is yellowish brown, slightly acid gravelly sandy loam, and the lower 20 inches is light yellowish brown, medium acid very gravelly coarse sandy loam. The substratum to a depth of 60 inches or more is variegated, medium acid very gravelly loamy coarse sand.

Permeability of this Treble soil is moderately rapid to a depth of about 27 inches and moderately rapid to rapid below this depth. Effective rooting depth is 60 inches or more. Available water capacity is very low to low. Runoff is rapid, and the hazard of water erosion is high.

Included in this unit are small areas of Priestlake gravelly sandy loam and Klootch gravelly sandy loam on north-facing mountain foot slopes; Jeru very stony sandy loam, warm, on mountain foot slopes; Bonner silt loam, cool, in benchlike areas; Hun gravelly silt loam at the higher elevations on mountainsides; and Rock outcrop on ridges and knobs.

This unit is used mainly for timber production, wildlife habitat, recreation, and watershed. It is also used as sites for homes and summer cabins and for limited livestock grazing.

Woodland.—Grand fir, western white pine, and Douglas-fir are the main woodland species on this unit. Among the trees of limited extent are ponderosa pine and western larch. On the basis of a 50-year site curve, the average site index for grand fir is 70. On the basis of a 100-year site curve, the average site index for Douglas-fir and ponderosa pine is 105. Yield tables indicate that the maximum average annual growth is 135 cubic feet per acre of grand fir at 105 years of age and 112 cubic feet per acre of Douglas-fir at 40 years of age.

This unit has few limitations for harvesting timber. If roads are constructed on the unit, slumping of cutbanks can be expected.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 20 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,800 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes.

Recreation.—Most areas of this unit are poorly suited to recreational development. Steepness of slope limits the use of these areas mainly to a few paths and trails, which on this unit should extend across the slope. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as recreational sites. Cuts and fills on this unit should be seeded or mulched.

Homesite development.—Most areas of this unit are poorly suited to homesite development. The main limitation is slope. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as homesites. Onsite investigation is required to identify these areas.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

This map unit is in capability subclass VIe and in woodland suitability subclass 1f.

54—Treble gravelly sandy loam, high precipitation, 35 to 65 percent slopes. This very deep, well drained soil is on south-facing mountainsides. It formed in glacial till derived dominantly from granite, gneiss, and schist and has a thin mantle of loess and volcanic ash. Elevation is 2,500 to 4,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is about 90 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 0.75 inch thick. The surface layer is dark grayish brown, slightly acid gravelly sandy loam about 2 inches thick. The upper 5 inches of the subsoil is yellowish brown, slightly acid gravelly sandy loam, and the lower 20 inches is light yellowish brown, medium acid very gravelly coarse sandy loam. The substratum to a depth of 60 inches or more is variegated, medium acid very gravelly loamy coarse sand.

Permeability of this Treble soil is moderately rapid to a depth of about 27 inches and moderately rapid to rapid below this depth. Effective rooting depth is 60 inches or more. Available water capacity is very low to low. Runoff is very rapid, and the hazard of water erosion is very high.

Included in this unit are small areas of Priestlake gravelly sandy loam, Jeru very stony sandy loam, warm, on north-facing side slopes; Hun gravelly silt loam at the higher elevations on mountainsides; Klootch gravelly sandy loam on north-facing side slopes; and Rock outcrop on ridges and knobs.

Most areas of this unit are used for timber production, wildlife habitat, recreation, and watershed. A few areas are used for limited livestock grazing.

Woodland.—Grand fir, western white pine, and Douglas-fir are the main woodland species on this unit. Among the trees of limited extent are ponderosa pine and western larch. On the basis of a 50-year site curve, the average site index for grand fir is 70. On the basis of a 100-year site curve, the average site index for Douglas-fir and ponderosa pine is 105. Yield tables indicate that the maximum average annual growth is 135 cubic feet per acre of grand fir at 105 years of age and 112 cubic feet per acre of Douglas-fir and ponderosa pine at 40 years of age.

The main limitations for the harvesting of timber are slope and the hazard of water erosion. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. If roads are constructed on this unit, slumping of cutbanks can be expected.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 20 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,800 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes. Slope may create livestock distribution problems.

*Recreation.*This unit is poorly suited to recreational development. Steepness of slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. The main limitation is slope.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

This map unit is in capability subclass VIIe and in woodland suitability subclass 1f.

55—Treble-Rock outcrop association, 20 to 65 percent slopes. This map unit is on mountainsides. Elevation is 2,200 to 3,600 feet. The average annual precipitation is about 28 inches, the average annual air

temperature is about 45 degrees F, and the average frost-free period is about 110 days.

This unit is about 45 percent Treble gravelly sandy loam and 30 percent Rock outcrop. The remaining 25 percent is included soils. The Treble soil is on south-facing side slopes, and Rock outcrop is on ridges and knobs.

Included in this unit are small areas of Lenz stony sandy loam near areas of Rock outcrop on ridges, Dufort silt loam on east- and west-facing side slopes and in concave areas; Pend Oreille silt loam on north-facing side slopes and in concave areas, and Ardtoo gravelly sandy loam on east- and west-facing side slopes.

The Treble soil is very deep and well drained. It formed in glacial till derived dominantly from granite, gneiss, and schist and has a thin mantle of loess and volcanic ash. Typically, the surface is covered with a mat of needles, leaves, and twigs about 0.75 inch thick. The surface layer is dark grayish brown, slightly acid gravelly sandy loam about 2 inches thick. The upper 5 inches of the subsoil is yellowish brown, slightly acid gravelly sandy loam, and the lower 20 inches is light yellowish brown, medium acid very gravelly coarse sandy loam. The substratum to a depth of 60 inches or more is variegated, medium acid very gravelly loamy coarse sand.

Permeability of this Treble soil is moderately rapid to a depth of about 27 inches and moderately rapid to rapid below this depth. Effective rooting depth is 60 inches or more. Available water capacity is very low to low. Runoff is rapid to very rapid, and the hazard of water erosion is high to very high.

Rock outcrop consists of areas of exposed granite, gneiss, or schist. It is fractured in places and has some soil material in the cracks and crevices. Areas of Rock outcrop are not suitable for most land uses.

Most areas of this unit are used for timber production, livestock grazing, wildlife habitat, recreation, and watershed. A few areas are used as homesites.

Woodland.—Douglas-fir and ponderosa pine are the main woodland species on the Treble soil. Among the trees of limited extent are western larch and lodgepole pine. On the basis of a 100-year site curve, the average site index for Douglas-fir and ponderosa pine is 105. Yield tables indicate that the maximum average annual growth for Douglas-fir and ponderosa pine is 112 cubic feet per acre at 40 years of age. The areas of Rock outcrop in this unit will reduce yield about 30 percent.

The main limitations for the harvesting of timber are slope, the hazard of water erosion, and the areas of Rock outcrop. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Wheeled and tracked equipment can be used in the more gently sloping areas. The areas of Rock outcrop may cause breakage of timber and hinder yarding. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished.

The seedling mortality rate may be high in summer because of the lack of adequate moisture in the soil. The areas of Rock outcrop limit the even distribution of naturally regenerated tree seedlings.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 15 to 25 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,000 pounds of air-dry vegetation per acre to less than 500 pounds per acre as the canopy closes. The production of forage is limited by the areas of Rock outcrop, which can interfere with movement of livestock and accessibility of forage. If the shrubs on this unit are managed to create open areas, the unit produces a good stand of desirable grasses and forbs. Slope may create livestock distribution problems.

Recreation.—This unit is poorly suited to recreational development. It is limited mainly by slope and the areas of Rock outcrop. Steepness of slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope.

Homesite development.—This unit is poorly suited to homesite development. The main limitations are slope and the areas of Rock outcrop.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

The Treble soil is in capability subclass VIIe, and Rock outcrop is in VIIIs. This unit is in woodland suitability subclass 2x.

56—Treble, high precipitation-Rock outcrop complex, 15 to 35 percent slopes. This map unit is on south-facing mountain foot slopes. Elevation is 2,500 to 3,600 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is about 90 days.

This unit is about 45 percent Treble gravelly sandy loam and 30 percent Rock outcrop. The remaining 25 percent is included soils. The Treble soil is on south-facing side slopes, and Rock outcrop is on convex side slopes and ridges. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Priestlake gravelly sandy loam and Jeru very stony sandy loam, warm, on north-facing mountain foot slopes; Hun gravelly silt loam at the higher elevations on mountainsides; Klootch gravelly sandy loam on north-facing mountainsides; and Bonner silt loam, cool, in benchlike areas.

The Treble soil is very deep and well drained. It formed in glacial till derived dominantly from granite, gneiss, and schist and has a thin mantle of loess and volcanic ash. Typically, the surface is covered with a mat of needles, leaves, and twigs about 0.75 inch thick. The surface layer is dark grayish brown, slightly acid gravelly sandy loam about 2 inches thick. The upper 5 inches of the subsoil is yellowish brown, slightly acid gravelly sandy loam, and the lower 20 inches is light yellowish brown, medium acid very gravelly coarse sandy loam. The substratum to a depth of 60 inches or more is variegated, medium acid very gravelly loamy coarse sand.

Permeability of this Treble soil is moderately rapid to a depth of about 27 inches and moderately rapid to rapid below this depth. Effective rooting depth is 60 inches or more. Available water capacity is very low to low. Runoff is rapid, and the hazard of water erosion is high.

Rock outcrop consists of areas of exposed granite, gneiss, or schist. It is hard rock that is fractured in places as a result of weathering. Some soil material is in the cracks and crevices. Areas of Rock outcrop are not suitable for most land uses.

This unit is used mainly for timber production, wildlife habitat, recreation, and watershed. It is also used as sites for homes and summer cabins. A few areas are used for limited livestock grazing.

Woodland.—Grand fir, western white pine, and Douglas-fir are the main woodland species on the Treble soil. Among the trees of limited extent are ponderosa pine and western larch. On the basis of a 50-year site curve, the average site index for grand fir is 70. On the basis of a 100-year site curve, the average site index for Douglas-fir and ponderosa pine is 105. Yield tables indicate that the maximum average annual growth is 135 cubic feet per acre of grand fir at 105 years of age and 112 cubic feet per acre of Douglas-fir and ponderosa pine at 40 years of age. The areas of Rock outcrop in this unit will reduce yield about 30 percent.

If roads are constructed on this soil, slumping of cutbanks can be expected. The areas of Rock outcrop may cause breakage of timber, hinder yarding operations, and limit the even distribution of naturally regenerated tree seedlings.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 20 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,300 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes. The production of forage is limited by the areas of Rock outcrop, which can interfere with movement of livestock and accessibility of forage.

Recreation.—Most areas of this unit are poorly suited to recreational development. Steepness of slope limits the use of these areas mainly to a few paths and trails, which should extend across the slope. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as recreational sites. Cuts and fills should be seeded or mulched. This unit is also limited for recreation by the hazard of erosion and the areas of Rock outcrop. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover.

Homesite development.—Most areas of this unit are poorly suited to homesite development. The main limitations are slope and the areas of Rock outcrop. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as homesites. Onsite investigation is required to identify these areas.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps to maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

This map unit is in capability subclass VIIs and in woodland suitability subclass 1x.

57—Treble, high precipitation-Rock outcrop complex, 35 to 65 percent slopes. This map unit is on south-facing mountainsides. Elevation is 2,500 to 4,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is about 90 days.

This unit is about 45 percent Treble gravelly sandy loam and 30 percent Rock outcrop. The remaining 25 percent is included soils. The Treble soil is on south-facing side slopes, and Rock outcrop is on convex side slopes and ridges. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Priestlake gravelly sandy loam and Jeru very stony sandy loam, warm, on north-facing side slopes; Hun gravelly silt loam at the higher elevations on mountainsides; Klootch gravelly sandy loam on north-facing side slopes; and Ardtoo gravelly loam on south-facing side slopes.

The Treble soil is very deep and well drained. It formed in glacial till derived dominantly from granite, gneiss, and schist and has a thin mantle of loess and volcanic ash. Typically, the surface is covered with a mat of needles, leaves, and twigs about 0.75 inch thick. The surface layer is dark grayish brown, slightly acid gravelly sandy loam about 2 inches thick. The upper 5 inches of the subsoil is yellowish brown, slightly acid gravelly sandy loam, and the lower 20 inches is light yellowish brown, medium acid very gravelly coarse sandy loam. The substratum to a depth of 60 inches or more is variegated, medium acid very gravelly loamy coarse sand.

Permeability of this Treble soil is moderately rapid to a depth of about 27 inches and is moderately rapid to rapid below this depth. Effective rooting depth is 60

inches or more. Available water capacity is very low to low. Runoff is very rapid, and the hazard of water erosion is very high.

Rock outcrop consists of areas of exposed granite, gneiss, or schist. It is hard rock that is fractured in places as a result of weathering. Some soil material is in the cracks and crevices. Areas of Rock outcrop are not suitable for most land uses.

Most areas of this unit are used for timber production, wildlife habitat, recreation, and watershed. A few areas are used for limited livestock grazing.

Woodland.—Grand fir, western white pine, and Douglas-fir are the main woodland species on the Treble soil. Among the trees of limited extent are ponderosa pine and western larch. On the basis of a 50-year site curve, the average site index for grand fir is 70. On the basis of a 100-year site curve, the average site index for Douglas-fir and ponderosa pine is 105. Yield tables indicate that the maximum average annual growth is 135 cubic feet per acre of grand fir at 105 years of age and 112 cubic feet per acre of Douglas-fir and ponderosa pine at 40 years of age. The areas of Rock outcrop in this unit will reduce yield about 30 percent.

The main limitations for the harvesting of timber are slope, the hazard of water erosion, and the areas of Rock outcrop. When harvesting timber, steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. The areas of Rock outcrop may cause breakage of timber, hinder yarding operations, and limit the even distribution of naturally regenerated tree seedlings. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. If roads are constructed on this soil, slumping of cutbanks can be expected.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 20 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,300 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes. The production of forage is limited by the areas of Rock outcrop, which can interfere with movement of livestock and accessibility of forage. Slope may create livestock distribution problems.

Recreation.—This unit is poorly suited to recreational development. It is limited mainly by slope and the areas of Rock outcrop. Steepness of slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope.

Homesite development.—This unit is poorly suited to homesite development. The main limitations are slope and the areas of Rock outcrop.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

This map unit is in capability subclass VIIs and in woodland suitability subclass 1x.

58—Vassar silt loam, 30 to 65 percent slopes. This deep to very deep, well drained soil is on north-facing mountainsides. It formed in material derived dominantly from granite, gneiss, and schist and has a thick mantle of volcanic ash. Elevation is 2,600 to 4,000 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 80 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is dark grayish brown, neutral silt loam about 1 inch thick. The the upper part of the subsoil is yellowish brown and light yellowish brown, neutral and slightly acid silt loam about 20 inches thick, and the lower part is very pale brown, slightly acid and medium acid gravelly sandy loam and cobbly sandy loam about 29 inches thick. Weathered schist is at a depth of about 50 inches.

Permeability of this Vassar soil is moderate. Effective rooting depth is 40 to 60 inches or more. Available water capacity is moderate. Runoff is very rapid, and the hazard of water erosion is very high.

Included in this unit are small areas of Ardtoo gravelly loam on south-facing side slopes; Moscow loam on east- and west-facing, convex side slopes; Kruse silt loam on southeast- and southwest-facing side slopes; and Vay silt loam on north-facing side slopes.

This unit is used mainly for timber production, wildlife habitat, watershed, and recreation. A few areas are used for limited livestock grazing.

Woodland. Western redcedar, western white pine, grand fir, and Douglas-fir are the main woodland species on this unit. Among the trees of limited extent are western larch and ponderosa pine. On the basis of a 50-year site curve, the average site index for grand fir is 90. Yield tables indicate that the maximum average annual growth is 173 cubic feet per acre of grand fir at 100 years of age.

The main limitations for the harvesting of timber are slope and the hazard of water erosion. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 10 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,200 pounds of air-dry vegetation per acre to less than 50 pounds per acre as the canopy closes. Slope may create livestock distribution problems.

Recreation.—This unit is poorly suited to recreational development. It is limited mainly by slope and the hazard of water erosion. Slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. The main limitation is slope.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

This map unit is in capability subclass VIIe and in woodland suitability subclass 1r.

59—Vassar-Moscow association, 35 to 65 percent slopes. This map unit is on mountainsides. Elevation is 2,600 to 4,000 feet.

This unit is about 40 percent Vassar silt loam and 35 percent Moscow loam. The remaining 25 percent is included soils. The Vassar soil is on north-facing side slopes and in ravines, and the Moscow soil is in east- and west-facing areas on ridges and in convex areas.

Included in this unit are small areas of Ardtoo gravelly loam on south-facing side slopes, Vay silt loam on north-facing side slopes, Lenz stony sandy loam in south-facing areas on ridges and in convex areas, and Kruse silt loam on east- and west-facing side slopes.

The Vassar soil is deep to very deep and is well drained. It formed in material derived dominantly from granite, gneiss, and schist and has a thick mantle of volcanic ash. The average annual precipitation is about 30 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 80 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is dark grayish brown, neutral silt loam about 1 inch thick. The upper part of the subsoil is yellowish brown and light yellowish brown, neutral and slightly acid silt loam about 20 inches thick, and the lower part is very pale brown, slightly acid and medium acid gravelly sandy loam and cobbly sandy loam about 29 inches thick. Weathered schist is at a depth of about 50 inches.

Permeability of the Vassar soil is moderate. Effective rooting depth is 40 to 60 inches or more. Available water capacity is moderate. Runoff is very rapid, and the hazard of water erosion is very high.

The Moscow soil is moderately deep and well drained. It formed in material derived dominantly from granite, gneiss, and schist and has a mantle of volcanic ash and loess. The average annual precipitation is about 30 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 100 days.

Typically, the surface is covered with a mat of needles, leaves, twigs, and moss about 1 inch thick. The surface layer is brown, slightly acid loam about 2 inches thick. The upper 17 inches of the subsoil is yellowish brown, slightly acid loam, and the lower 7 inches is very pale brown, medium acid sandy loam. Weathered and fractured schist is at a depth of about 26 inches.

Permeability of the Moscow soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is low. Runoff is very rapid, and the hazard of water erosion is very high.

This unit is used mainly for timber production, wildlife habitat, watershed, and recreation. A few areas are used for limited livestock grazing.

Woodland.—Western redcedar, western white pine, grand fir, and Douglas-fir are the main woodland species on the Vassar soil. Among the trees of limited extent are western larch and ponderosa pine. On the basis of a 50-year site curve, the average site index for grand fir is 90. Yield tables indicate that the maximum average annual growth for grand fir at 100 years of age is 173 cubic feet per acre.

Grand fir, Douglas-fir, and ponderosa pine are the main woodland species on the Moscow soil. Among the trees of limited extent are western larch and lodgepole pine. On the basis of a 100-year site curve, the average site index for Douglas-fir is 105. Yield tables indicate that the maximum average annual growth for Douglas-fir at 40 years of age is 112 cubic feet per acre.

The main limitations for the harvesting of timber on this unit are slope and the hazard of water erosion. When harvesting timber, steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished.

Plant competition on the Vassar soil is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—The Vassar soil can produce forage for livestock and big game animals for 5 to 10 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,200 pounds of air-dry vegetation per acre to less than 50 pounds per acre as the canopy closes.

The Moscow soil can produce forage for livestock and big game animals for 10 to 20 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,800 pounds of air-dry vegetation per acre to less than 150 pounds per acre as the canopy closes. Slope may create livestock distribution problems.

Recreation.—This unit is poorly suited to recreational development. It is limited mainly by slope and hazard of water erosion. Slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. The main limitation is slope.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

This map unit is in capability subclass VIIe. The Vassar soil is in woodland suitability subclass 1r, and the Moscow soil is in 2d.

60—Vay gravelly silt loam, 35 to 65 percent slopes. This deep to very deep, well drained soil is on mountainsides. It formed in material derived dominantly from granite, gneiss, and schist and has a thick mantle of volcanic ash. Elevation is 3,600 to 4,800 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 75 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is yellowish brown, medium acid gravelly silt loam about 6 inches thick. The upper part of the subsoil is light yellowish brown and pale brown, medium acid gravelly silt loam and very gravelly loam about 19 inches thick, and the lower part is very pale brown, slightly acid extremely gravelly coarse sandy loam about 17 inches thick. Weathered granite is at a depth of about 42 inches.

Permeability of this Vay soil is moderate. Effective rooting depth is 40 to 60 inches or more. Available water capacity is low. Runoff is very rapid, and the hazard of water erosion is very high.

Included in this unit are small areas of Ardtoo gravelly loam on south-facing convex side slopes; Treble gravelly sandy loam on south-facing foot slopes; and Hun gravelly silt loam and Jeru very stony sandy loam, warm, in the higher areas on mountainsides.

This unit is used for timber production, wildlife habitat, recreation, watershed, and limited livestock grazing.

Woodland.—Western redcedar, grand fir, western white pine, and Douglas-fir are the main woodland species on this unit. Among the trees of limited extent are western hemlock, western larch, and ponderosa pine. On the basis of a 50-year site curve, the average site index is 80 for grand fir and 75 for western white. On the basis of a 100-year site curve, the average site index is 120 for Douglas-fir. Yield tables indicate that the maximum average annual growth is 154 cubic feet per acre of grand fir at 100 years of age, 144 cubic feet per acre of western white pine at 103 years of age, and 141 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are slope and the hazard of water erosion. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. Special design for roads is needed to overcome the limitation of slope and the susceptibility of the soil to slumping when saturated.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 10 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,000 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes. Slope may create livestock distribution problems.

Recreation.—This unit is poorly suited to recreational development. It is limited mainly by slope and the hazard of water erosion. Steepness of slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. The main limitation is slope.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

This map unit is in capability subclass VIIe and in woodland suitability subclass 1r.

61—Vay silt loam, cool, 30 to 65 percent slopes. This deep to very deep, well drained soil is at the higher elevations on mountainsides. It formed in material derived dominantly from granite, gneiss, and schist and has a mantle of volcanic ash. Elevation is 4,600 to 5,600 feet. The average annual precipitation is about 45 inches, the average annual air temperature is about 40 degrees F, and the average frost-free period is about 45 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The

surface layer is yellowish brown, medium acid silt loam about 6 inches thick. The the upper part of the subsoil is light yellowish brown and pale brown, medium acid gravelly silt loam and very gravelly loam about 19 inches thick, and the lower part to a depth of about 60 inches is very pale brown, slightly acid extremely gravelly coarse sandy loam. Weathered granite is at a depth of about 60 inches.

Permeability of this Vay soil is moderate. Effective rooting depth is 40 to 60 inches or more. Available water capacity is low. Runoff is very rapid, and the hazard of water erosion is very high.

Included in this unit are small areas of Vay gravelly silt loam and Hun gravelly silt loam in the lower areas on mountainsides, Prouty gravelly loam on ridges and convex side slopes, Brickel stony loam on mountain ridges and in the higher areas on mountainsides.

This unit is used mainly for timber production, recreation, wildlife habitat, and watershed. A few areas are used for limited livestock grazing.

Woodland.—Subalpine fir, Engelmann spruce, and western larch are the main woodland species on this unit. Among the trees of limited extent are western white pine, grand fir, and Douglas-fir. On the basis of a 100-year site curve, the average site index is 90 for subalpine fir and 80 for Engelmann spruce. Yield tables indicate that the maximum average annual growth is 90 cubic feet per acre of subalpine fir at 90 years of age and 76 cubic feet per acre of Engelmann spruce at 100 years of age.

The main limitations for the harvesting of timber are slope and the hazard of water erosion. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. Special design for roads is needed to overcome the limitation of slope and the susceptibility of the soil to slumping when saturated.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 15 to 20 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,200 pounds of air-dry vegetation per acre to less than 400 pounds per acre as the canopy closes. Slope may create livestock distribution problems.

Recreation.—This unit is poorly suited to recreational development. It is limited mainly by slope and the hazard of water erosion. Steepness of slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. The main limitation is slope.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

This map unit is in capability subclass VIIe and in woodland suitability subclass 3r.

62—Vay-Ardtoo association, 20 to 35 percent slopes. This map unit is on mountainsides. Elevation is 2,300 to 5,200 feet.

This unit is about 40 percent Vay silt loam and 35 percent Ardtoo gravelly loam. The remaining 25 percent is included soils. The Vay soil is on north-facing side slopes and in ravines, and the Ardtoo soil is on south-facing, convex side slopes.

Included in this unit are small areas of Pend Oreille silt loam on the lower part of north-facing side slopes; Treble gravelly sandy loam on the lower part of south-facing side slopes; Melder loam on south-facing, convex side slopes; and Lenz stony sandy loam in south-facing areas on ridges and convex side slopes.

The Vay soil is deep to very deep and is well drained. It formed in material derived dominantly from granite, gneiss, and schist and has a thick mantle of volcanic ash. The average annual precipitation is about 38 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 80 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is yellowish brown, medium acid silt loam about 6 inches thick. The upper part of the subsoil is light yellowish brown and pale brown, medium acid gravelly silt loam and very gravelly loam about 19 inches thick, and the lower part is very pale brown, slightly acid extremely gravelly coarse sandy loam about 17 inches thick. Weathered granite is at a depth of about 42 inches.

Permeability of the Vay soil is moderate. Effective rooting depth is 40 to 60 inches or more. Available water capacity is low. Runoff is rapid to very rapid, and the hazard of water erosion is very high.

The Ardtoo soil is deep and well drained. It formed in material derived dominantly from granite, gneiss, and schist and has a mantle of loess and volcanic ash. The average annual precipitation is about 38 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 100 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1.5 inches thick. The surface layer is dark gray and pale brown, slightly acid gravelly loam about 6 inches thick. The upper 6 inches of the subsoil is light yellowish brown, slightly acid

gravelly loam, and the lower 33 inches is very pale brown, slightly acid and medium acid very gravelly coarse sandy loam. Weathered gneiss is at a depth of about 45 inches.

Permeability of the Ardtoo soil is moderate. Effective rooting depth is 40 to 60 inches or more. Available water capacity is low. Runoff is rapid to very rapid, and the hazard of water erosion is high.

This unit is used for timber production, livestock grazing, recreation, wildlife habitat, and watershed.

Woodland.—Western redcedar, grand fir, western white pine, and Douglas-fir are the main woodland species on the Vay soil. Among the trees of limited extent are western hemlock, western larch, and ponderosa pine. On the basis of a 50-year site curve, the average site index is 80 for grand fir and 75 for western white pine. On the basis of a 100-year site curve, the average site index for Douglas-fir is 120. Yield tables indicate that the maximum average annual growth is 154 cubic feet per acre of grand fir at 100 years of age, 144 cubic feet per acre of western white pine at 103 years of age, and 141 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are the hazard of water erosion and susceptibility of the soil to compaction. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Grand fir, Douglas-fir, ponderosa pine, and western larch are the main woodland species on the Ardtoo soil. On the basis of a 50-year site curve, the average site index for grand fir is 70. On the basis of a 100-year site curve, the average site index is 110 for Douglas-fir and 105 for ponderosa pine. Yield tables indicate that the maximum average annual growth is 135 cubic feet per acre of grand fir at 105 years of age, 122 cubic feet per acre of Douglas-fir at 40 years of age, and 112 cubic feet per acre of ponderosa pine at 40 years of age.

Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. If seed trees are present, natural regeneration of cutover areas by Douglas-fir and ponderosa pine occurs readily.

Livestock grazing.—The Vay soil can produce forage for livestock and big game animals for 10 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,000 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes.

The Ardtoo soil can produce forage for livestock and big game animals for 10 to 20 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,800 pounds of air-dry vegetation per acre to less than 150 pounds per acre as the canopy closes.

Recreation.—Most areas of this unit are poorly suited to recreational development because of slope. Steepness of slope limits the use of these areas mainly to a few paths and trails, which should extend across the slope. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as recreational sites. If the unit is used for recreational development, it is also limited by the hazard of water erosion. Drainage should be provided for paths and trails. Cuts and fills should be seeded or mulched.

Homesite development.—Most areas of this unit are poorly suited to homesite development because of slope. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as homesites. Onsite investigation is required to identify these areas.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

This map unit is in capability subclass VIe. The Vay soil is in woodland suitability subclass 1r, and the Ardtoo soil is in 1f.

63—Vay-Ardtoo association, 35 to 65 percent slopes. This map unit is on mountainsides. Elevation is 2,300 to 5,200 feet.

This unit is about 40 percent Vay silt loam and 35 percent Ardtoo gravelly loam. The remaining 25 percent is included soils. The Vay soil is on north-facing side slopes and in ravines, and the Ardtoo soil is on south-facing, convex side slopes.

Included in this unit are small areas of Pend Oreille silt loam on the lower part of north-facing side slopes, Lenz stony sandy loam in south-facing areas on ridges and convex side slopes, Treble gravelly sandy loam on the lower part of south-facing side slopes, and Melder loam on south-facing side slopes.

The Vay soil is deep to very deep and is well drained. It formed in material derived dominantly from granite, gneiss, and schist and has a thick mantle of volcanic ash. The average annual precipitation is about 38 inches, the average annual air temperature is about 42 degrees F, and the average frost-free period is about 80 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is yellowish brown, medium acid silt loam about 6 inches thick. The upper part of the subsoil is light yellowish brown and pale brown, medium acid gravelly silt loam and very gravelly loam about 19 inches thick, and the lower part is very pale brown, slightly acid extremely gravelly coarse sandy loam about 17 inches thick. Weathered granite is at a depth of about 42 inches.

Permeability of the Vay soil is moderate. Effective rooting depth is 40 to 60 inches or more. Available water capacity is low. Runoff is very rapid, and the hazard of water erosion is very high.

The Ardtoo soil is deep and well drained. It formed in material derived dominantly from granite, gneiss, and schist and has a mantle of loess and volcanic ash. The average annual precipitation is about 38 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 100 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1.5 inches thick. The surface layer is dark gray and pale brown, slightly acid gravelly loam about 6 inches thick. The upper 6 inches of the subsoil is light yellowish brown, slightly acid gravelly loam, and the lower 33 inches is very pale brown, slightly acid and medium acid very gravelly coarse sandy loam. Weathered gneiss is at a depth of about 45 inches.

Permeability of the Ardtoo soil is moderate. Effective rooting depth is 40 to 60 inches or more. Available water capacity is low. Runoff is very rapid, and the hazard of water erosion is very high.

This unit is used for timber production, limited livestock grazing, recreation, wildlife habitat, and watershed.

Woodland.—Western redcedar, grand fir, western white pine, and Douglas-fir are the main woodland species on the Vay soil. Among the trees of limited extent are western hemlock, western larch, and ponderosa pine. On the basis of a 50-year site curve, the average site index is 80 for grand fir and 75 for western white pine. On the basis of a 100-year site curve, the average site index is 120 for Douglas-fir. Yield tables indicate that the maximum average annual growth is 154 cubic feet per acre of grand fir at 100 years of age, 144 cubic feet per acre of western white pine at 103 years of age, and 141 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are slope and the hazard of water erosion. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. Special design for roads is needed to overcome the limitation of slope and the susceptibility of the soil to slumping when saturated.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Grand fir, Douglas-fir, ponderosa pine, and western larch are the main woodland species on the Ardtoo soil. On the basis of a 50-year site curve, the average site index for grand fir is 70. On the basis of a 100-year site curve, the average site index is 110 for Douglas-fir and 105 for ponderosa pine. Yield tables indicate that the maximum average annual growth is 135 cubic feet per acre of grand fir at 105 years of age, 122 cubic feet per acre of Douglas-fir at 40 years of age, and 112 cubic feet per acre of ponderosa pine at 40 years of age.

The main limitations for the harvesting of timber are slope and the hazard of water erosion. Steepness of slope restricts the use of wheeled and tracked equipment in skidding operations; cable yarding systems generally are safer and disturb the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. If seed trees are present, natural regeneration of cutover areas by Douglas-fir and ponderosa pine occurs readily.

Livestock grazing.—The Vay soil can produce forage for livestock and big game animals for 10 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,000 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes.

The Ardtoo soil can produce forage for livestock and big game animals for 10 to 20 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,800 pounds of air-dry vegetation per acre to less than 150 pounds per acre as the canopy closes. Slope may create livestock distribution problems.

Recreation.—This unit is poorly suited to recreational development. The main limitations are slope and the hazard of water erosion. Steepness of slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Drainage should be provided for paths and trails. Cuts and fills should be seeded or mulched.

Homesite development.—This unit is poorly suited to homesite development. The main limitation is slope.

Watershed.—This unit should be managed to keep soil erosion to a minimum, which helps maintain its value as watershed. Soil erosion can be minimized by careful management of the timber and understory vegetation on the unit.

This map unit is in capability subclass VIIe. The Vay soil is in woodland suitability subclass 1r, and the Ardtoo soil is in 1f.

64—Wrencoe silty clay, 0 to 2 percent slopes. This very deep, very poorly drained soil is on low stream terraces, flood plains, and bottom lands. It formed in lake-laid sediment derived from mixed sources. Elevation is 2,050 to 2,100 feet. The average annual precipitation is about 32 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is about 100 days.

Typically, the surface is covered with a mat of grass, roots, stems, and leaves about 0.5 inch thick. The surface layer is mixed gray and grayish brown, slightly acid silty clay about 10 inches thick. The subsoil is mottled, gray, light gray, light brownish gray, and white, slightly acid and neutral silty clay about 50 inches thick or more.

Permeability of this Wrencoe soil is slow. Effective rooting depth is limited by a seasonal high water table that is at a depth of 0 to 18 inches from December to June. Available water capacity is high. Runoff is very slow, and the hazard of water erosion is slight. This soil is subject to very long periods of flooding in winter and spring, depending upon the regulation of outflow from the Albeni Falls Dam.

Included in this unit are small areas of Hoodoo silt loam in level depressional areas on flood plains and bottom lands; Pywell muck, undrained, in basins on flood plains and bottom lands; Bonner gravelly silt loam on the higher outwash terraces; and Mission silt loam on the higher terraces.

This unit is used for hay and pasture (fig. 9), livestock grazing, wildlife habitat, and recreation.

Cropland.—This unit is poorly suited to cultivated crops. It is limited mainly by the seasonal high water table, the hazard of flooding, and the clayey soil texture.

Hay and pasture.—This unit is suited to hay and pasture. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Among the adapted improved forage plants are timothy, meadow foxtail, reed canarygrass, tall fescue, and alsike clover.

Livestock grazing.—This unit can produce forage for livestock and big game animals continuously. The average annual production of air-dry vegetation ranges from 6,000 pounds in favorable years to 4,000 pounds per acre in unfavorable years. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

Figure 9.—Typical area of Wrencoe silty clay, 0 to 2 percent slopes, used for hay and pasture.

Recreation.—This unit is poorly suited to recreational development. It is limited mainly by the hazard of flooding, the seasonal high water table, wetness, and the clayey soil texture.

Homesite development.—This unit is poorly suited to homesite development. The main limitations are the hazard of flooding, wetness, a hazard of frost heaving, and slow permeability.

This map unit is in capability subclass Vw.

prime farmland

Prime farmland, as defined by the United States Department of Agriculture, is the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It must either be used for producing food or fiber or be available for these uses. It has the soil quality, length of growing season, and moisture supply needed to economically produce a sustained high yield of crops when it is managed properly. Prime farmland produces the highest yields with minimal energy and economic resources, and farming it results in the least disturbance of the environment.

Prime farmland commonly has an adequate and dependable supply of moisture from precipitation or irrigation. It also has a favorable temperature and length of growing season and an acceptable level of acidity or alkalinity. It has few if any rock fragments and is permeable to water and air. Prime farmland is not excessively eroded or saturated with water for long periods and is not flooded during the growing season. The slope is no more than 6 percent.

About 65,565 acres, or nearly 6 percent, of the survey area meets the soil requirements for prime farmland. This acreage is scattered throughout the area, but most of it is in the southwestern and north-central parts, mainly in general map units 8 and 10. Approximately one-third of this prime farmland is used for crops and pasture (fig. 10). The rest is in woodland. The main crops grown on this land are spring wheat, oats, barley, and grass-legume hay.

A recent trend in land use in some parts of the area has been the loss of some prime farmland to urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible or poorly drained, are difficult to cultivate, and generally are less productive.

The following map units meet the requirements for prime farmland when irrigated and where slope is less than 6 percent. This list does not constitute a recommendation for a particular land use.

2	Bonner gravelly silt loam, 0 to 4 percent slopes
9	Colburn very fine sandy loam, 0 to 4 percent slopes
20	Kaniksu sandy loam, 0 to 4 percent slopes
23	Kootenai gravelly silt loam, 0 to 4 percent slopes
43	Rathdrum silt loam, 0 to 2 percent slopes
45	Rathdrum-Bonner silt loams, 0 to 8 percent slopes
48	Selle fine sandy loam, 0 to 8 percent slopes

Figure 10.—Area of Kootenai gravelly silt loam, 0 to 4 percent slopes, classified as prime farmland if irrigated.

use and management of the soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

crops and pasture

By Harry J. Riehle, agronomist, and Vern A. Bromgard, district conservationist, Soil Conservation Service.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed soil map units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

The survey area has about 80,000 acres of cropland, hayland, and pastureland. Of this total, about 20,000 acres is used primarily for crop production and 60,000 acres for hay and pasture. Supplemental irrigation is used during the dry season on about 4,000 acres of cropland and on about 2,700 acres of hayland and pastureland.

Spring wheat, oats, and barley are the main crops grown in the area. The short growing season limits crop production. Spring grain is often grown as a cash crop before establishing hay or pasture (fig. 11). Growing hay and pasture in combination with a livestock operation is the most common farming enterprise in the area (fig. 12).

When grain is grown, crop residue should be left on the surface to maintain the organic matter content and tilth of the soil and to control erosion. Including grasses and legumes in the cropping system also helps control erosion and maintain soil fertility and tilth. Grain generally responds to nitrogen fertilizer, and legumes respond to phosphorus. A good fertilization program is essential for the highest production.

Steeply sloping soils should be farmed across the slope, and long slopes should be broken up by stripcropping. Tillage should be designed to keep the soil rough and cloddy. A minimum of 1,500 pounds of crop residue should be kept on the soil surface during the winter to protect the soil from erosion. Use of minimum tillage and no-till practices is advisable.

Irrigation water is supplied from local streams, ponds, or shallow wells. Sprinkler irrigation is the most widely used method of applying water. Applications of irrigation water should be adjusted to the available water capacity of the soil, the water intake rate, and crop needs.

Drainage from local seeps and wet bottom land soils is a concern in some areas. Both open drains and tile lines have been effectively used. Some of the soils have a seasonal high water table or are subject to flooding, which limits the types of crops that can be grown and their yield.

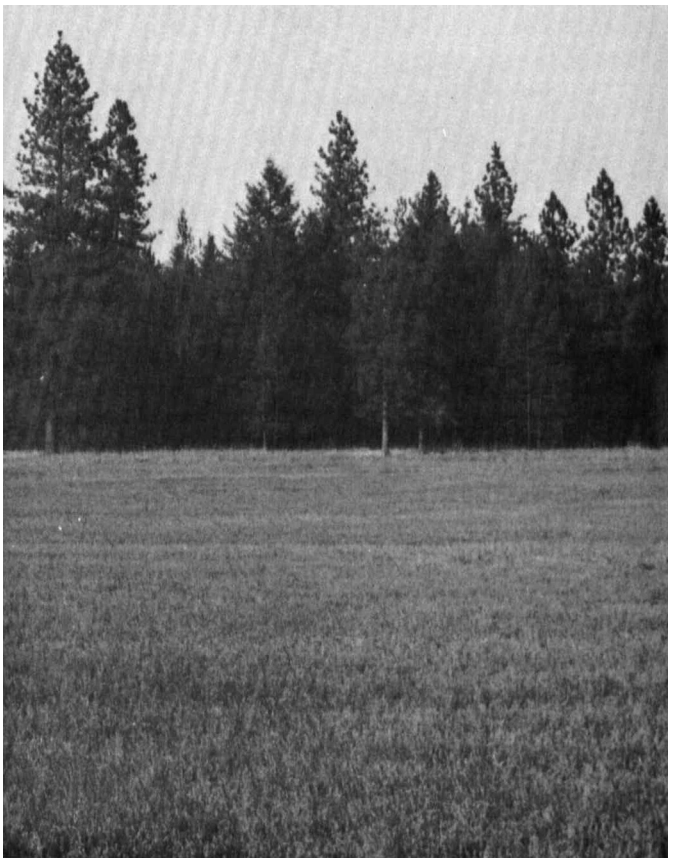


Figure 11.—Area of hayland on Bonner gravelly silt loam, 0 to 4 percent slopes.

Much of the hayland and pastureland in the area is in poor condition because of continuous overgrazing throughout the season, lack of sufficient fertilizer, and encroachment of less productive plant species. As a result, the production of forage has been greatly reduced and the hayland and pastureland have been invaded by weeds. Soil erosion and gullying occur in the drainageways in some areas. Improved management is needed if increased yields are to be obtained.

Among the management practices that are needed in this area are rotation grazing systems, cross-fencing, water development, and allowing adequate periods for regrowth. To meet plant needs, the use of high-producing adapted plants and a fertilization program that includes the application of nitrogen, phosphorus, and sulfur is essential. Grasses generally respond to nitrogen and sulfur, and legumes respond to phosphorus. Animals should not be allowed to graze too early in spring, before the plants have reached adequate growth and the soils are firm enough.

Hayland management can be improved by using fertilizer as needed, cutting hay when it is at the proper protein content, and leaving an adequate amount of fall stubble to protect the plants.

yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant

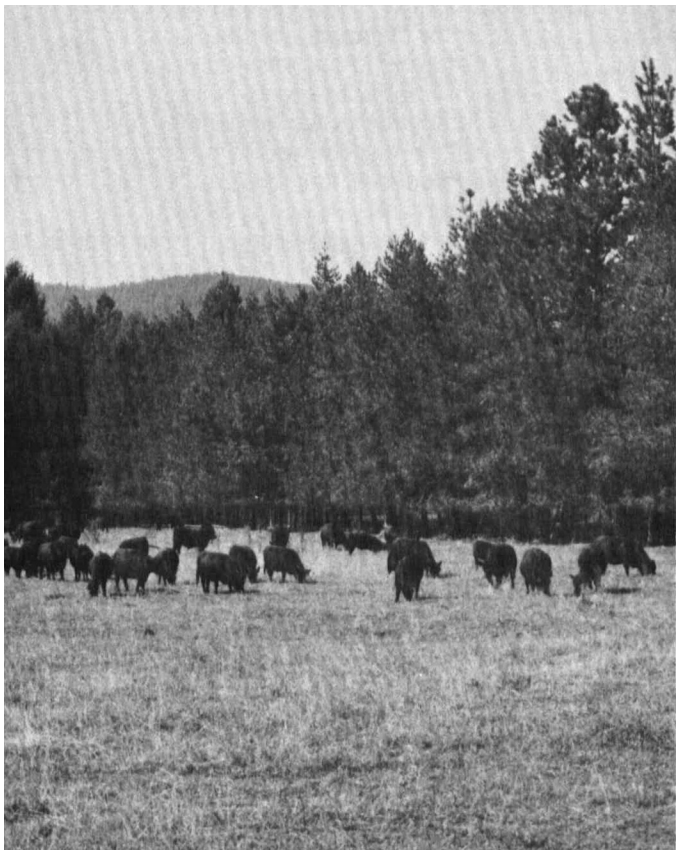


Figure 12.—Livestock grazing pasture established on Bonner gravelly silt loam, 0 to 4 percent slopes.

diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils.

land capability classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops (*9*). Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have slight limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section "Detailed soil map units."

woodland management and productivity

By Donald S. Larson, area forester, Soil Conservation Service.

The lumber and logging industries in this survey area were established in 1866 with the construction of the first lumber mill at Cabinet Landing on the Clark Fork River, below Cabinet Gorge. During the last quarter of the 19th century, several small mills were operated in the area to provide lumber, shingles, and railroad ties for the construction of new towns, mining operations, and two transcontinental railroads. Between 1904 and 1906 at least nine mills were operating in the area. The output of lumber in 1904 was more than 65 million board feet. Logging and producing lumber have remained the most important industries in the area.

Logging began along Pend Oreille Lake and the Clark Fork and the Pend Oreille Rivers. Logs were rafted and towed to the mills by steamboat. Thirty-four steamboats were operating on Pend Oreille Lake in 1906. As the timber was cut, logging camps were moved up the major tributary streams. The Clark Fork, Priest, and Pack Rivers and Sand Creek were used to convey logs to Pend Oreille Lake and the Pend Oreille River. Logs cut on the flats extending from Athol to Naples were hauled to mills on standard gauge railroads. Steamboats and logging railroads have been replaced by logging trucks.

A variety of tree species grow in the survey area. On the lower flats and benches in the southwestern corner, Douglas-fir and ponderosa pine predominate along with large acreages of lodgepole pine that became established following forest fires (fig. 13).

In the Priest Lake area, western white pine, grand fir, western hemlock, Douglas-fir, and western larch are the main species, with the Douglas-fir and ponderosa pine growing on the drier south- and west-facing slopes. Western redcedar grows on the wetter sites, both on the lower slopes and the bottom land soils. Here patches of old-growth cedar have survived forest fires. This mixed species forest generally is located at elevations of as much as 5,000 feet. Above 5,000 feet Englemann spruce and subalpine fir become the predominant tree species.

In the eastern part of the area, where annual precipitation exceeds 35 inches annual growth rates for western white pine and grand fir are the highest. The benches on both sides of the Clark Fork River are excellent growing sites for mixed species forest.

The soils in the valley north of Sandpoint are also excellent timber producing soils. Most of this area, however, has been cleared for hay and pasture, and large tracts of land are being subdivided for housing.

More than 40 percent of the woodland acreage is on steep erodible soils. Logging roads and skid trails must be carefully planned to provide adequate drainage and prevent excessive soil erosion. Upon completion of timber harvesting, roads, landings, and spoil banks that will no longer be used should be provided with water bars and seeded with adapted grass species.

The map unit descriptions in the section "Detailed soil map units" provide a brief discussion of soil-, harvest-, and production-related limitations. Maximum average annual growth, expressed in cubic feet per acre, is given for one or more tree species. These growth figures are

Figure 13.—Second growth lodgepole pine, Douglas-fir, and ponderosa pine on Bonner gravelly silt loam, 0 to 4 percent slopes.

based on data from yield tables (*3,6*) and are determined using the average site indexes. The growth figures, when more than one species is given for a soil, are not cumulative. They represent potential maximum average annual growth assuming that only one specific tree species is present.

Table 6 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: x, w, t, d, c, s, f, and r.

In table 6, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade where there are openings in the tree canopy. The invading plants compete with native plants or planted seedlings. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* indicates that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed to control undesirable plants.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

woodland understory vegetation

Understory vegetation consists of grasses, forbs, shrubs, and other plants. Some woodland, if well managed, can produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the trees.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees in the canopy, the density of the canopy, and the depth and condition of the litter. The density of the canopy determines the amount of light that understory plants receive.

Table 7 shows, for each soil suitable for woodland use, the potential for producing understory vegetation. The total production of understory vegetation includes the herbaceous plants and the leaves, twigs, and fruit of woody plants up to a height of 4 1/2 feet. It is expressed in pounds per acre of air-dry vegetation in favorable, normal, and unfavorable years. In a favorable year, soil moisture is above average during the optimum part of the growing season; in a normal year, soil moisture is average; and in an unfavorable year, it is below average.

Table 7 also lists the common names of the characteristic vegetation on each soil and the percentage composition, by air-dry weight, of each kind of plant. The table shows the kind and percentage of understory plants expected under a canopy density that is most nearly typical of woodland in which the production of wood crops is highest.

grazable woodland

By Larry D. Ellicott, range conservationist, Soil Conservation Service.

Approximately 190,000 acres of woodland in the survey area is now grazed or has the potential to be grazed. Because production of timber is the primary use of this woodland, livestock grazing should be managed to protect the timber resource.

Plants growing beneath the tree canopy are affected by the amount and quality of light they receive. In general, no usable forage is available in areas where the density of the canopy is 60 percent or more. In areas where timber stands are opened up by logging, fire, or other disturbance, usable forage can be produced for 5 to 25 years before the canopy closes again (fig. 14). The length of time depends on the plant community, soils, climate, and other factors. Seeding disturbed areas with adapted plants greatly enhances the production of forage. Areas that have become heavily infested with weeds and other undesirable plants can be improved with chemical or mechanical treatment.

Any grazing management system to be used on forest land must be designed to protect the soil from excessive erosion. It is also important to protect meadows and areas along watercourses. These are natural areas of concentration for livestock, and they commonly are in a depleted condition because of continual overuse. Grazing should be delayed until the soil in these areas is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. To enhance the quality of forage, a deferred rotation grazing system should be used.

The most important management practice is proper grazing use based on selected key plant species. Use of planned grazing systems that provide for periodic rest to allow key plants to mature and restriction of grazing during wet periods are advisable. Other good management practices include water development, fencing, and salting in areas away from water and other natural areas of concentration.

windbreaks and environmental plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, hold snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To insure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 8 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from a nursery.

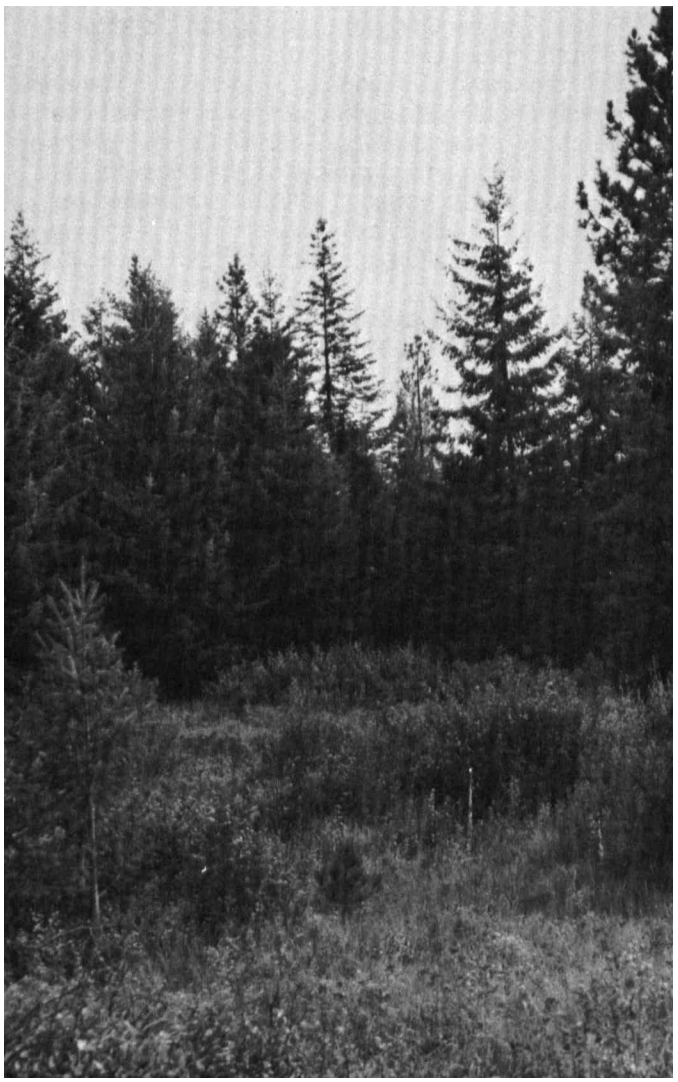


Figure 14.—An open stand of timber on Kootenai gravelly silt loam, 0 to 4 percent slopes, that provides grazable understory for livestock.

recreation

The survey area is an excellent scenic and recreational area. It includes forested mountains, two large lakes—Pend Oreille and Priest Lakes,— three major rivers—the Priest, Pack, and Clark Fork Rivers,— and many smaller lakes and streams. Fishing is good for all types of trout and spiny rayed species. Pend Oreille Lake is well known for its trophy size Kamloops and Dolly Varden trout and for its kokanee salmon. Priest Lake has kokanee salmon and trophy size mackinaw trout, as well as many other species.

Big game hunting is good in the area. Deer, elk, moose, bear, cougar, and mountain goat inhabit the area. Grouse are plentiful, and excellent waterfowl habitat is provided by the many lakes and streams. Pend Oreille Lake is one of the main resting areas for migratory waterfowl each spring and fall.

Many public and private campgrounds, resorts, and motels along the lakes provide excellent facilities for boating, fishing, and water sports. Schweitzer Basin ski resort, which overlooks Pend Oreille Lake, provides excellent winter sports facilities from December to May. The increased demand for land to provide recreational facilities is expected to continue for many years.

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

wildlife habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining

specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are blue wildrye, pine reedgrass, bluebunch wheatgrass, elk sedge, hawkweed, peavine, and geranium.

Coniferous plants furnish browse, seeds, and cones. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are redstem ceanothus, baldhip rose, snowberry, and mountain blueberry.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include Hungarian partridge, pheasant, meadowlark, field sparrow, cottontail, and woodchuck.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, elk, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, shore birds, muskrat, mink, and beaver.

engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils

may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

building site development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic

matter in the surface layer affect trafficability after vegetation is established.

sanitary facilities

Table 12 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to effectively filter the effluent. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over

bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

construction materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

water management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

soil properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

engineering index properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and their morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains particles coarser than sand, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as Pt. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

physical and chemical properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of

soil lost. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.
2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.
5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.
6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.
7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.
8. Stony or gravelly soils and other soils not subject to wind erosion.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 16, the estimated content of organic matter of the plow layer is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

soil and water features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes are not considered flooding.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An artesian water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A perched water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises to or above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*11*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. In table 18, the soils of the survey area are classified according to the system. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Inceptisol, meaning beginning soil.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ochrept (*Ochr*, meaning pale, plus *ept*, from Inceptisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Xerochrepts (*Xer*, meaning dry, plus *ochrept*, the suborder of the Inceptisols that have an ochric epipedon).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Xerochrepts.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is sandy, mixed, frigid, mesic Typic Xerochrepts.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series. An example is the Kaniksu series.

soil series and their morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*8*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*11*). Unless otherwise stated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed soil map units."

Ardtoo series

The Ardtoo series consists of deep and very deep, well drained soils on mountains. These soils formed in material weathered from granite, gneiss, and schist and have a mantle of loess and volcanic ash. Slope is 20 to 65 percent. Elevation is 2,300 to 5,000 feet. Average annual precipitation is 30 to 40 inches, and average annual air temperature is 43 to 45 degrees F.

These soils are loamy-skeletal, mixed, frigid Dystric Xerochrepts.

Typical pedon of an Ardtoo gravelly loam in an area of Vay-Ardtoo association, 35 to 65 percent slopes; about 2 miles southeast of Vay; about 1,650 feet south and

1,200 feet east of the northwest corner of sec. 20, T. 55 N., R. 3 W.

O1—1.5 inches to 0.5 inch; needles, leaves, and twigs.
O2—0.5 inch to 0; decomposed organic matter.
A1—0 to 1 inch; dark gray (10YR 4/1) gravelly loam, very dark gray (10YR 3/1) moist; moderate fine granular structure; soft, very friable, slightly plastic; many very fine and fine roots; many very fine and common fine tubular pores; 15 percent gravel; slightly acid (pH 6.4); abrupt wavy boundary.
B21—1 inch to 6 inches; pale brown (10YR 6/3) gravelly loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure parting to weak fine and medium granular; soft, very friable, slightly plastic; many very fine and fine roots, common medium roots, and few coarse roots; many very fine, common fine, and few medium tubular pores; 15 percent gravel; slightly acid (pH 6.4); gradual wavy boundary.
B22—6 to 12 inches; light yellowish brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; soft, very friable, slightly plastic; many very fine and fine roots and common medium and coarse roots; many very fine, common fine, and few medium tubular pores; 20 percent gravel; slightly acid (pH 6.2); clear wavy boundary.
IIB31—12 to 25 inches; very pale brown (10YR 7/3) very gravelly coarse sandy loam, yellowish brown (10YR 5/4) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly plastic; common very fine, fine, medium, and coarse roots; common very fine and fine tubular pores and few medium tubular pores; 35 percent gravel; slightly acid (pH 6.2); clear wavy boundary.
IIB32t—25 to 45 inches; very pale brown (10YR 7/3) very gravelly coarse sandy loam, brown (10YR 5/3) moist; massive; hard, firm, slightly plastic; few very fine, fine, and medium roots; common very fine and fine tubular pores; 35 percent gravel and 5 percent cobbles; six thin clay bands 1/8 to 1/4 inch thick; medium acid (pH 6.0); abrupt wavy boundary.
IICr—45 inches; weathered gneiss.

Bedrock is at a depth of 40 to 60 inches or more. Base saturation is 35 to 60 percent between depths of 10 and 30 inches.

A1 horizon: Texture is gravelly loam or gravelly sandy loam. Gravel content is 15 to 20 percent. Value is 4 or 5 when dry and 2 or 3 when moist, and chroma is 1 to 3 when dry or moist. The A1 horizon is 1 inch to 6 inches thick. Reaction is slightly acid or neutral.

B2 horizon: Hue is 10YR or 7.5YR, value is 5 to 7 when dry and 3 to 5 when moist, and chroma is 3 or 4 when dry and 3 to 6 when moist. Texture is gravelly, very gravelly, or very cobbly loam or sandy loam. Rock fragment content is 15 to 45 percent. Reaction is medium acid to neutral.

IIB3 horizon: Hue is 10YR or 7.5YR, value is 6 or 7 when dry and 4 to 6 when moist, and chroma is 3 or 4 when dry or moist. Texture is extremely gravelly, extremely cobbly, very gravelly, or very cobbly coarse sandy loam or sandy loam. Rock fragment content is 35 to 75 percent. Reaction is medium acid to neutral.

Bonner series

The Bonner series consists of very deep, well drained soils on terraces and terrace escarpments. These soils formed in glacial outwash material derived dominantly from granite, gneiss, and schist and have a mantle of volcanic ash and loess. Slope is 0 to 65 percent. Elevation is 2,050 to 3,000 feet. Average annual precipitation is 25 to 38 inches, and average annual air temperature is 42 to 46 degrees F.

These soils are coarse-loamy over sandy or sandy-skeletal, mixed, frigid Andic Xerochrepts.

Typical pedon of Bonner gravelly silt loam, 0 to 4 percent slopes (fig. 15); about 1.5 miles southeast of Oldtown; about 2,100 feet east and 100 feet north of the southwest corner of sec. 30, T. 56 N., R. 5 W.

O11—1.3 inches to 1 inch; fresh coniferous needles and twigs.
O12—1 to 0.2 inch; partially decayed needles and twigs.
O2—0.2 inch to 0; highly decayed organic matter.
A1—0 to 5 inches; pale brown (10YR 6/3) gravelly silt loam, dark brown (10YR 3/3) moist; weak very fine granular structure; soft, very friable, slightly plastic; many fine and medium roots; many fine interstitial pores; 15 percent gravel; slightly acid (pH 6.3); abrupt smooth boundary.
B2ir—5 to 21 inches; pale brown (10YR 6/3) gravelly silt loam brown (10YR 4/3) moist; weak very fine granular structure; soft, very friable slightly plastic; many fine and medium roots; many very fineinterstitial pores; 15 percent gravel; slightly acid (pH 6.3) abrupt smooth boundary.
IIB3—21 to 29 inches; very pale brown (10YR 7/3) gravelly sandy loam, brown (10YR 4/3) moist; massive; slightly hard, friable, slightly plastic; many fine roots; many fine tubular pores; 25 percent gravel and cobbles; slightly acid (pH 6.2); gradual wavy boundary.
IIIC1—29 to 39 inches; very pale brown (10YR 7/3) very gravelly loamy sand, brown (10YR 4/3) moist; massive; slightly hard, very friable; many fine roots; many fine and few coarse tubular pores; 40 percent gravel and cobbles; slightly acid (pH 6.1); gradual wavy boundary.
IIIC2—39 to 60 inches; very pale brown (10YR 7/3) very gravelly loamy sand, brown (10YR 4/3) moist; single

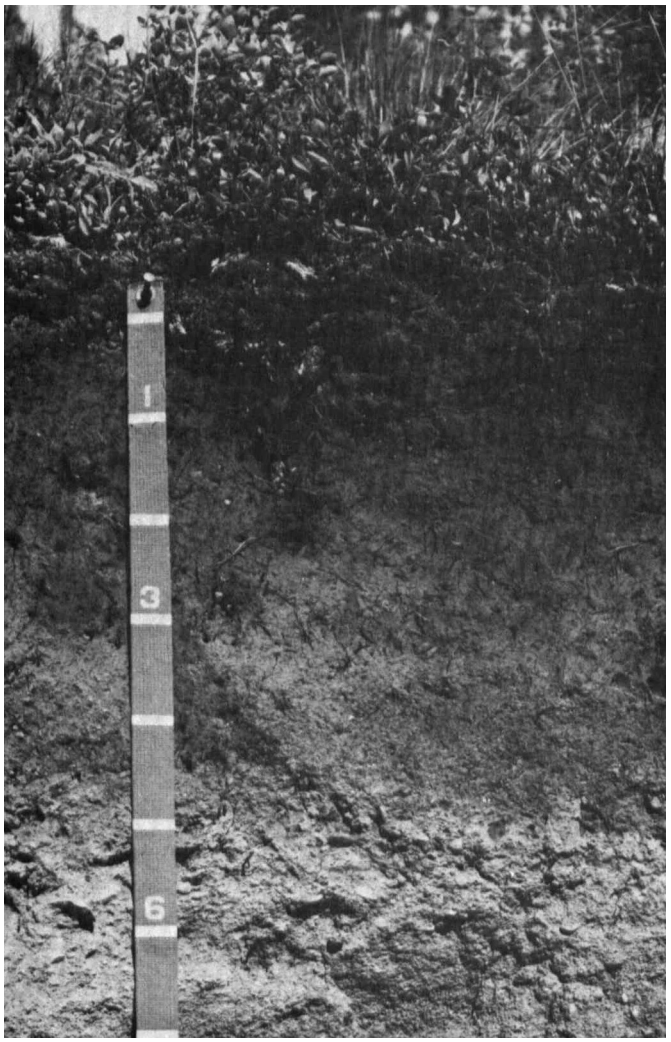


Figure 15.—Profile of Bonner gravelly silt loam, 0 to 4 percent slopes. The upper 21 inches is mainly volcanic ash.

grain; loose; few fine roots; many fine and medium pores; 60 percent gravel and cobbles; neutral (pH 6.7).

The solum is 24 to 36 inches thick. Reaction is medium acid to neutral. Some pedons have a 1/8-inch to 1/4-inch-thick layer of light gray volcanic ash at the surface.

A1 horizon: Value is 5 or 6 when dry, and chroma is 2 or 3 when moist or dry. Texture is silt loam or gravelly silt loam. Gravel content is 0 to 20 percent.

B2ir—horizon: Hue is 10YR or 7.5YR, value is 5 to 7 when dry and 3 or 4 when moist, and chroma is 3 or 4 when dry or moist. Texture commonly is silt loam or loam, but in some areas it is gravelly silt loam or gravelly loam. Coarse fragment content is 0 to 35 percent.

IIB3—horizon: Value is 6 or 7 when dry and 4 or 5 when moist, and chroma is 3 or 4 when dry or moist. Texture is gravelly sandy loam or gravelly loam. Coarse fragment content is 15 to 35 percent. In some pedons this horizon has a few thin clay films, and in some pedons it is hard when dry and firm when moist.

IIIC horizon: Texture commonly is very gravelly or extremely gravelly loamy sand, sand, or coarse sand, but in some pedons it is very cobbly loamy sand, sand, or coarse sand. Coarse fragment content is 35 to 85 percent.

Brickel series

The Brickel series consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from granite, gneiss, and schist and have a mantle of loess and volcanic ash. Slope is 5 to 45 percent. Elevation is 5,000 to 6,500 feet. Average annual precipitation is 45 to 55 inches, and average annual air temperature is 39 to 41 degrees F.

These soils are loamy-skeletal, mixed Typic Cryoborolls.

Typical pedon of a Brickel stony loam in an area of Brickel-Rubble land association, 5 to 45 percent slopes, about 4 miles east of Priest Lake, on Sundance Mountain; about 2,900 feet east and 1,600 feet north of the southwest corner of sec. 5, T. 59 N., R. 3 W.

O1—1 inch to 0; leaves and twigs.

A1—0 to 7 inches; dark grayish brown (10YR 4/2) stony loam, very dark brown (10YR 2/2) moist; moderate fine and medium granular structure; slightly hard, friable, slightly plastic; many very fine, fine, and medium roots; many very fine interstitial pores and many fine tubular pores; 10 percent stones, 10 percent cobbles, and 10 percent gravel; 2 percent stones on surface; medium acid (pH 6.0); clear wavy boundary.

B21—7 to 11 inches; yellowish brown (10YR 5/4) very stony loam, dark yellowish brown (10YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly plastic; many very fine and fine roots and common medium roots; common very fine interstitial pores and few fine tubular pores; 25 percent gravel, 10 percent cobbles, and 10 percent stones; medium acid (pH 6.0); clear wavy boundary.

B22—11 to 15 inches; yellowish brown (10YR 5/4) very stony loam, dark yellowish brown (10YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly plastic; common very fine, fine, and medium roots; common very fine interstitial pores and few fine tubular pores; 30 percent gravel, 10 percent cobbles, and 15 percent stones; medium acid (pH 6.0); clear wavy boundary.

C—15 to 27 inches; light yellowish brown (10YR 6/4) extremely stony sandy loam, dark yellowish brown (10YR 4/4) moist; massive; loose; common very fine and fine roots; many very fine interstitial pores; 30 percent gravel, 30 percent stones, and 20 percent cobbles; medium acid (pH 6.0); abrupt wavy boundary.
R—27 inches; fractured granite.

Bedrock is at a depth of 20 to 40 inches. Stones cover 0.1 to 3 percent of the surface. Reaction is medium acid or slightly acid. The mollic epipedon is 7 to 15 inches thick.

A1 horizon: Value is 3 to 5 when dry and 2 or 3 when moist, and chroma is 2 to 4 when dry and 1 to 3 when moist. Rock fragment content is 20 to 35 percent.

B2 horizon: Value is 5 or 6 when dry, and chroma is 3 or 4 when dry or moist. Texture is very cobbly, extremely cobbly, or very stony loam or sandy loam. Rock fragment content is 35 to 75 percent.

C horizon: Value is 6 or 7 when dry and 4 or 5 when moist, and chroma is 3 or 4 when moist. Texture is very stony, very cobbly, or extremely stony sandy loam. Rock fragment content is 50 to 80 percent.

Cabinet series

The Cabinet series consists of very deep, moderately well drained soils on terraces. These soils formed in glacial lake-laid sediment derived from mixed sources and have a mantle of loess and volcanic ash. Slope is 2 to 30 percent. Elevation is 2,100 to 2,800 feet. Average annual precipitation is 30 to 38 inches, and average annual air temperature is 42 to 45 degrees F.

These soils are clayey over loamy, mixed, frigid Aquultic Haploxeralfs.

Typical pedon of Cabinet silt loam, 2 to 12 percent slopes, about 0.25 mile west of the Idaho-Montana border, near Cabinet Gorge; about 800 feet west and 1,150 feet north of the southeast corner of sec. 34, T. 55 N., R. 3 E.

O1—0.5 inch to 0; needles, twigs, and leaves.
A1—0 to 3 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; soft, very friable, slightly plastic; many very fine and fine roots and few medium roots; many very fine and common fine tubular pores; medium acid (pH 6.0); clear wavy boundary.
B21ir—3 to 11 inches; light yellowish brown (10YR 6/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine roots and few fine and medium roots; common very fine and few fine tubular pores; medium acid (pH 6.0); abrupt wavy boundary.
IIA&Bb—11 to 19 inches; white (10YR 8/2) silty clay loam, brown (10YR 5/3) moist; moderate coarse prismatic structure parting to moderate medium and coarse angular blocky; very hard, very firm, slightly sticky and plastic; common very fine and few fine roots matted on peds; common very fine and few fine tubular pores; many moderately thick clay films in pores and on faces of peds; few fine manganese concretions; strongly acid (pH 5.5); clear wavy boundary.
IIB22tb—19 to 27 inches; pink (7.5YR 7/4) clay, brown (7.5YR 5/4) moist; moderate very coarse prismatic structure parting to moderate coarse angular blocky; extremely hard, extremely firm, very sticky and very plastic; few very fine and fine roots matted on peds; few very fine and fine tubular pores; many thick clay films in pores and on faces of peds; few fine manganese concretions and stains; coatings that are reddish gray (5YR 5/2) when moist on faces of peds; very strongly acid (pH 5.0); gradual wavy boundary.
IIB23tb—27 to 35 inches; pink (7.5YR 7/4) clay, reddish brown (5YR 5/3) moist; weak very coarse prismatic structure parting to moderate coarse angular blocky; extremely hard, extremely firm, very sticky and very plastic; few very fine and fine roots matted on peds; few very fine and fine tubular pores; many thick clay films in pores and on faces of peds; common medium manganese stains; coatings that are pinkish gray (5YR 6/2) and brown (7.5YR 5/4) when moist on faces of peds; very strongly acid (pH 5.0); abrupt wavy boundary.
IIIB31tb—35 to 43 inches; pink (7.5YR 7/4) very fine sandy loam, light reddish brown (5YR 6/3) moist; massive; slightly hard, friable, slightly plastic; few very fine and fine roots; few very fine and fine tubular and interstitial pores; few thin clay bridges between mineral grains; few fine manganese stains; 1/4-inch-thick discontinuous band of iron stains; coatings that are brown (7.5YR 5/4) and pinkish gray (7.5YR 6/2) when moist on faces of peds; strongly acid (pH 5.5); abrupt wavy boundary.
IVB32tb—43 to 49 inches; pink (7.5YR 7/4) clay, light reddish brown (5YR 6/3) moist; common medium and large distinct mottles that are pinkish gray (5YR 6/2) and light gray (5YR 7/1) when moist; massive; very hard, very firm, very sticky and very plastic; few very fine and fine roots; few very fine vesicular pores; common thick clay films in pores and clay bridges between mineral grains; many medium manganese stains; many medium coatings of silt on faces of peds; strongly acid (pH 5.3); abrupt wavy boundary.

VB33tb—49 to 54 inches; pink (7.5YR 7/4) very fine sandy loam, brown (7.5YR 5/4) moist; massive; hard, firm, slightly plastic; few very fine interstitial pores; few thin clay bridges between mineral grains; common medium manganese stains; medium acid (pH 5.9); abrupt wavy boundary.

VIB34tb—54 to 60 inches; light brown (7.5YR 6/4) clay, brown (7.5YR 5/4) moist; massive; very hard, very firm, very sticky and very plastic; few very fine vesicular pores; common moderately thick clay films in pores and bridging mineral grains; many large manganese stains; medium acid (pH 5.6).

A perched water table is at a depth of 0.5 to 2.0 feet from February to May. Some pedons have a 1/8- to 1/2-inch-thick layer of light gray volcanic ash at the surface.

A1 horizon: Chroma is 2 or 3 when moist. Reaction is medium acid to neutral.

B2ir horizon: Hue is 10YR or 7.5YR, value is 4 or 5 when moist, and chroma is 3 to 6 when moist or dry. Reaction is medium acid to neutral.

IIA&Bb horizon: Chroma is 2 or 3 when moist or dry. Texture is silt loam or silty clay loam. Reaction is strongly acid or medium acid.

IIB2tb horizon: Hue is 10YR, 7.5YR, or 5YR, value is 4 to 7 when moist, and chroma is 2 to 4 when dry. Mottles have value of 4 to 7 when moist and chroma of 2 to 6 when moist. Texture is clay or silty clay. Clay content is 50 to 70 percent. Base saturation is 35 to 60 percent. Reaction is very strongly acid to medium acid.

B3tb horizon: Texture is stratified very fine sandy loam, clay, loam, silty clay loam, and silty clay. Reaction is very strongly acid to medium acid.

Capehorn series

The Capehorn series consists of very deep, poorly drained soils on small valley bottoms and flood plains. These soils formed in glacial outwash and alluvium derived dominantly from granite, gneiss, and schist and have a mantle of volcanic ash and loess. Slope is 0 to 2 percent. Elevation is 2,075 to 4,200 feet. Average annual precipitation is 30 to 45 inches, and average annual air temperature is 41 to 43 degrees F.

These soils are medial over sandy or sandy-skeletal, mixed, nonacid Aeric Cryaquepts.

Typical pedon of Capehorn silt loam, 0 to 2 percent slopes, about 0.2 mile northwest of Indian Creek Campground near Priest Lake; about 600 feet south and 1,350 feet west of the northeast corner of sec. 27, T. 61 N., R. 4 W.

O1—2 inches to 1 inch; needles, leaves, and twigs.

02—1 inch to 0; decomposed organic matter.

A1—0 to 7 inches; yellowish brown (10YR 5/4) silt loam, dark yellowish brown (10YR 3/4) moist; moderate fine and medium granular structure; soft, very friable, slightly plastic; many very fine roots and common fine and medium roots; many very fine and common fine tubular pores; few fine iron and manganese stains; 5 percent fine gravel; medium acid (pH 6.0); clear wavy boundary.

B2ir—7 to 15 inches; light yellowish brown (10YR 6/4) gravelly silt loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, slightly plastic; common very fine and fine roots and few medium roots; common very fine and few fine tubular pores; few fine iron and manganese stains; 15 percent fine gravel; medium acid (pH 6.0); abrupt wavy boundary.

IIC1g—15 to 29 inches; white (10YR 8/2) very gravelly loamy sand, light brownish gray (10YR 6/2) moist; many medium and large prominent mottles that are strong brown (7.5YR 5/6) when moist; single grain; loose; few very fine and fine roots; many very fine interstitial pores; 35 percent gravel; slightly acid (pH 6.4); clear wavy boundary.

IIC2g—29 to 60 inches; white (10YR 8/2) very gravelly sand, light brownish gray (10YR 6/2) moist; many medium and large prominent mottles that are strong brown (7.5YR 5/6) when moist; single grain; loose; few very fine roots; many very fine interstitial pores; 35 percent gravel and 20 percent cobbles; slightly acid (pH 6.4).

A seasonal high water table is at the surface to a depth of 1.5 feet from January to June. The solum is 12 to 20 inches thick. Some pedons have a discontinuous layer of light gray volcanic ash 1 inch thick or less on the surface.

A1 horizon: Hue is 10YR or 2.5Y, value is 5 or 6 when dry and 3 or 4 when moist, and chroma is 2 to 4 when moist or dry. Fine gravel content is 0 to 15 percent. Reaction is strongly acid or medium acid.

B2ir horizon: Hue is 10YR or 2.5Y, value is 6 or 7 when dry and 3 to 5 when moist, and chroma is 2 to 4 when moist or dry. Texture is gravelly silt loam, silt loam, or very fine sandy loam. In some pedons a few faint mottles are in the lower part of the horizon. Fine gravel content is 0 to 20 percent. Reaction is strongly acid or medium acid.

IICg horizon: Hue is 10YR, 2.5Y, or 5Y, value is 6 to 8 when dry and 5 or 6 when moist, and chroma is 1 or 2 when moist or dry. Mottles have hue of 5YR, 7.5YR, or 10YR, value of 4 or 5 when moist, and chroma of 4 to 8 when moist. The horizon is 25 to 60 percent gravel, 0 to 20 percent cobbles, and 0 to 5 percent stones. Reaction is medium acid to neutral.

Colburn series

The Colburn series consists of very deep, somewhat poorly drained soils on alluvial fans and low terraces adjacent to flood plains. These soils formed in alluvium derived from mixed sources. Slope is 0 to 4 percent. Elevation is 2,075 to 2,300 feet. Average annual precipitation is 30 to 35 inches, and average annual air temperature is 42 to 45 degrees F.

These soils are coarse-loamy over sandy or sandy-skeletal, mixed, frigid Aquic Xerochrepts.

Typical pedon of Colburn very fine sandy loam, 0 to 4 percent slopes; about 1.5 miles east of U.S. Highway 95 at Samuels, on county road east of Sand Creek; about 40 feet north and 375 feet east of the southwest corner of sec. 27, T. 59 N., R. 1 W.

A1—0 to 3 inches; brown (10YR 5/3) very fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, slightly plastic; many very fine and fine roots; many very fine and fine tubular and interstitial pores; few fine and medium manganese concretions; slightly acid (pH 6.2); abrupt smooth boundary.

B21ir—3 to 6 inches; light yellowish brown (10YR 6/4) very fine sandy loam, brown (7.5YR 4/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly plastic; common very fine and fine roots; few very fine and fine tubular pores; many very fine and few fine and medium manganese concretions; slightly acid (pH 6.4); clear smooth boundary.

B22ir—6 to 12 inches; light yellowish brown (10YR 6/4) very fine sandy loam, brown (7.5YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly plastic; common very fine and fine roots; few very fine tubular pores; common very fine and fine and few medium manganese concretions; slightly acid (pH 6.4); clear smooth boundary.

B23ir—12 to 18 inches; light yellowish brown (10YR 6/4) very fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly plastic; common very fine roots; few very fine tubular pores; few very fine manganese concretions; neutral (pH 6.6); abrupt smooth boundary.

B24t—18 to 20 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 4/3) moist; few fine prominent mottles that are strong brown (7.5YR 5/8) when moist; moderate fine and medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine roots; few very fine and fine tubular pores; few thin clay films on faces of peds; neutral (pH 7.0); abrupt wavy boundary.

IIB31tg—20 to 24 inches; light gray (2.5Y 7/2) fine sandy loam, light brownish gray (2.5Y 6/2) moist; many fine prominent mottles that are strong brown (7.5YR 5/8) when moist and common medium distinct mottles that are light olive brown (2.5Y 5/4) when moist; massive; hard, firm, slightly plastic; few very fine roots; few very fine tubular pores; few thin clay films as bridges between mineral grains; 1/4-inch-thick clay band that is brown (10YR 4/3) when moist; neutral (pH 7.0); abrupt wavy boundary.

IIB32tg—24 to 29 inches; light gray (5Y 7/2) loamy fine sand, light olive gray (5Y 6/2) moist; many fine prominent mottles that are strong brown (7.5YR 5/8) when moist and common medium distinct mottles that are light olive brown (2.5Y 5/4) when moist; massive; slightly hard, friable; common very fine tubular pores; two clay bands that are 1/4 to 1/2 inch thick and are brown (10YR 4/3 and 7.5YR 4/4) when moist; neutral (pH 6.6); clear wavy boundary.

IIC1g—29 to 48 inches; light gray (5Y 7/2) fine sand, light brownish gray (2.5Y 6/2) moist; common medium prominent mottles that are strong brown (7.5YR 5/6) when moist; single grain; loose, very friable; many very fine interstitial pores; slightly acid (pH 6.4); gradual smooth boundary.

IIC2g—48 to 65 inches; light gray (5Y 7/2) fine sand, grayish brown (2.5Y 5/2) moist; many medium and large prominent mottles that are strong brown (7.5YR 5/6) when moist; single grain; loose, very friable; many very fine interstitial pores; neutral (pH 7.0).

The solum is 20 to 36 inches thick. A seasonal high water table is at a depth of 2 to 3 feet from February to May. Reaction is medium acid to neutral.

A1 horizon: Value is 4 or 5 when dry and 2 or 3 when moist, and chroma is 1 to 3 when moist or dry.

B2 horizon: Value is 6 or 7 when dry and 4 or 5 when moist. Texture is very fine sandy loam or silt loam.

IIB3tg horizon: Hue is 10YR, 2.5Y, or 5Y, and value is 7 or 8 when dry and 5 or 6 when moist. Mottles have hue of 7.5YR, 10YR, or 2.5Y and are faint to prominent.

IICg horizon: Hue is 10YR, 2.5Y, or 5Y, chroma is 1 or 2 when moist, and value is 7 or 8 when dry and 5 or 6 when moist. Texture is loamy sand or fine sand. Mottles have hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 2 to 8 when moist. They are faint to prominent. In some pedons, this horizon is stratified with thin layers of coarse sand and gravel.

Dufort series

The Dufort series consists of very deep, well drained soils on foothills and mountains. These soils formed in glacial till derived dominantly from granitic and metamorphic rock and have a mantle of volcanic ash and loess. Slope is 5 to 45 percent. Elevation is 2,100 to

3,600 feet. Average annual precipitation is 25 to 38 inches, and average annual air temperature is 42 to 45 degrees F.

These soils are medial over loamy-skeletal, mixed, frigid Andic Xerochrepts.

Typical pedon of Dufort silt loam, 5 to 45 percent slopes, about 2 miles east of U.S. Highway 95, on Dufort Road; about 1,930 feet east and 5 feet north of the southwest corner of sec. 27, T. 56 N., R. 2 W.

O1—0.5 inch to 0; slightly decomposed grasses.
A1—0 to 2 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak very fine and fine granular structure; very soft, very friable, slightly plastic; many very fine and fine roots and few medium roots; common very fine and fine tubular and interstitial pores; slightly acid (pH 6.5); clear wavy boundary.
B21ir—2 to 13 inches; yellowish brown (10YR 5/4) silt loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly plastic; common very fine and fine roots and few medium roots; common very fine and fine tubular and interstitial pores; neutral (pH 6.8); abrupt wavy boundary.
B22irt—13 to 24 inches; yellowish brown (10YR 5/4) gravelly silt loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and few fine tubular pores; few thin clay films on faces of peds; 25 percent gravel; medium acid (pH 6.0); clear wavy boundary.
IIC1—24 to 34 inches; light gray (2.5Y 7/2) very gravelly sandy loam, light olive brown (2.5Y 5/4) moist; weak medium and coarse subangular blocky structure; hard, firm, slightly plastic; few very fine roots; common very fine tubular pores; few thin silt coatings on faces of peds; 30 percent gravel and 10 percent cobbles; neutral (pH 6.6); clear wavy boundary.
IIC2—34 to 60 inches; light gray (2.5Y 7/2) very gravelly sandy loam, light olive brown (2.5Y 5/4) moist; massive; hard, firm, slightly plastic; few very fine roots; few very fine tubular pores; colloidal stains on mineral grains; 30 percent gravel, 10 percent cobbles, and 5 percent stones; neutral (pH 6.6).

The solum is 15 to 28 inches thick. Reaction is medium acid to neutral.

A1 horizon: Value is 2 or 3 when moist, and chroma is 2 to 4 when moist or dry. Gravel content is 0 to 5 percent gravel.

B2 horizon: Hue is 10YR or 7.5YR, value is 3 to 5 when moist, and chroma is 3 to 6 when moist or dry. Texture is gravelly silt loam, gravelly loam, silt loam, or loam. Gravel content is 0 to 25 percent. Bulk density is 0.85 to 0.95 gram per cubic centimeter at a depth of 14 inches or more.

IIC horizon: Hue is 2.5Y or 10YR, value is 4 to 6 when moist, and chroma is 3 or 4 when moist and 2 to 4 when dry. Texture is very gravelly sandy loam, very cobbly sandy loam, or very gravelly fine sandy loam. Rock fragment content is 35 to 60 percent.

Elmira series

The Elmira series consists of very deep, excessively drained soils on terraces and dunes. These soils formed in sandy, glacial lake-laid sediment that has been reworked by wind. Slope is 0 to 20 percent. Elevation is 2,050 to 2,600 feet. Average annual precipitation is 28 to 33 inches, and average annual air temperature is 44 to 46 degrees F.

These soils are mixed, frigid Alfic Xeropsamments.

Typical pedon of Elmira loamy sand in an area of Selle-Elmira complex, 0 to 20 percent slopes; about 0.5 mile west of U.S. Highway 95, on first county road north of Elmira; about 1,700 feet west and 30 feet north of the southeast corner of sec. 4, T. 59 N., R. 1 W.

O11—2.5 to 2 inches; very slightly decomposed needles, leaves, and twigs.
O12—2 inches to 0.7 inch; moderately decomposed needles, leaves, and twigs.
O2—0.7 inch to 0; highly decomposed organic matter.
A1—0 to 4 inches; brown (10YR 5/3) loamy sand, very dark grayish brown (10YR 3/2) moist; moderate very fine granular structure; soft, very friable; many very fine, fine, medium, and coarse roots; many very fine interstitial pores; slightly acid (pH 6.2); clear wavy boundary.
B21—4 to 9 inches; light yellowish brown (10YR 6/4) loamy sand, dark yellowish brown (10YR 3/4) moist; weak very fine granular structure; soft, very friable; many very fine, fine, medium, and coarse roots; many very fine interstitial pores; slightly acid (pH 6.3); clear wavy boundary.
B22—9 to 17 inches; light yellowish brown (10YR 6/4) loamy sand, dark yellowish brown (10YR 4/4) moist; weak very fine granular structure; soft, very friable; many very fine, fine, medium, and coarse roots; many very fine interstitial pores; slightly acid (pH 6.3); clear wavy boundary.
B23—17 to 25 inches; light yellowish brown (10YR 6/4) loamy sand, dark brown (10YR 4/3) moist; massive; soft, friable; few very fine and fine roots; many very fine interstitial pores and few fine tubular pores; slightly acid (pH 6.2); diffuse wavy boundary.

B31t—25 to 36 inches; light brownish gray (2.5Y 6/2) sand, brown (10YR 4/3) moist; single grain; loose, very friable; few very fine and fine roots; many very fine interstitial pores; three clayey bands 2 to 5 milimeters thick; slightly acid (pH 6.2); diffuse wavy boundary.

B32t—36 to 60 inches; pale brown (10YR 6/3) sand, brown (10YR 4/3) moist; single grain; loose; several wavy bands 2 milimeters thick; many fine pores; slightly acid (pH 6.4).

The profile is medium acid to neutral.

A1 horizon: Value is 4 or 5 when dry and 2 or 3 when moist, and chroma is 2 or 3 when moist or dry.

B2 horizon: Hue is 7.5YR or 10YR, value is 5 or 6 when dry, and chroma is 3 or 4 when moist or dry. Texture is loamy sand or loamy fine sand.

B3t horizon: Value is 6 or 7 when dry and 4 or 5 when moist, and chroma is 2 to 4 when moist or dry. Texture is loamy sand, loamy fine sand, fine sand, or sand.

Elmira Variant

The Elmira Variant consists of very deep, poorly drained soils on alluvial fans near lake shorelines. These soils formed in alluvium derived dominantly from granitic and metamorphic rock and have a thin mantle of loess and volcanic ash. Slope is 0 to 2 percent. Elevation is 2,440 to 2,500 feet. Average annual precipitation is 30 to 35 inches, and average annual air temperature is 42 to 44 degrees F.

These soils are siliceous, frigid Aquic Xeropsamments.

Typical pedon of Elmira Variant loamy coarse sand, 0 to 2 percent slopes; about 0.25 mile north of Priest Lake, near Mosquito Bay; about 1,980 feet east and 660 feet north of the southwest corner of sec. 3, T. 62 N., R. 4 W.

O1—1 to 0.25 inch; slightly decomposed needles, leaves, twigs, and moss.

O2—0.25 inch to 0; highly decomposed needles, leaves, twigs, and moss.

A2—0 to 4 inches; light gray (10YR 7/1) loamy coarse sand, grayish brown (10YR 5/2) moist; weak fine and medium subangular blocky structure; very soft, very friable; many very fine and fine roots, common medium and few coarse roots; many very fine and common fine interstitial pores; strongly acid (pH 5.2); abrupt smooth boundary.

B2—4 to 8 inches; yellowish brown (10YR 5/6) loamy coarse sand, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; very soft, very friable; many very fine and fine roots, common medium and few coarse roots; many very fine and fine interstitial pores; medium acid (pH 5.8); clear smooth boundary.

C1—8 to 33 inches; very pale brown (10YR 7/3) coarse sand, brown (10YR 5/3) moist; many large distinct mottles that are yellowish brown (10YR 5/6) when moist; single grain; soft, friable; many very fine and few fine roots; many fine pores; three wavy and discontinuous reddish yellow (7.5YR 6/8) iron bands about 0.5 inch thick; medium acid (pH 5.8); clear wavy boundary.

C2g—33 to 43 inches; variegated coarse sand; many large distinct mottles that are brownish yellow (10YR 6/8) when moist; single grain; loose; common very fine roots; many fine pores; 5 percent fine gravel; medium acid (pH 5.8); gradual wavy boundary.

C3g—43 to 60 inches; variegated coarse sand; common medium distinct mottles that are yellow (10YR 7/6) when moist; single grain; loose; few very fine roots; many fine pores; 5 percent fine gravel; medium acid (pH 5.8).

The solum is 3 to 11 inches thick. A seasonal high water table is at a depth of 1 foot to 2 feet from February to June. Some pedons have a layer of light gray (10YR 7/1) volcanic ash 0.75 inch thick or less on the surface.

A2 horizon: Value is 6 or 7 when dry and 5 or 6 when moist, and chroma is 1 or 2 when moist or dry. Reaction is very strongly acid or strongly acid.

B2 horizon: Hue is 10YR or 7.5YR, value is 5 or 6 when dry and 3 or 4 when moist, and chroma is 4 to 6 when moist or dry. Texture is loamy coarse sand or loamy sand. Reaction is strongly acid or medium acid.

C horizon: Hue is 7.5YR, 10YR, 2.5Y, or variegated, value is 7 or 8 when dry and 5 to 7 when moist, and chroma is 2 or 3 when moist or dry. Texture commonly is coarse sand or sand, but in some pedons it is gravelly coarse sand or gravelly sand. Mottles have hue of 10YR or 7.5YR. Fine gravel content is 0 to 20 percent. Reaction is medium acid or slightly acid.

Hoodoo series

The Hoodoo series consists of very deep, poorly drained soils in drainageways and on bottom lands and flood plains. These soils formed in alluvium derived dominantly from volcanic ash. Slope is 0 to 2 percent. Elevation is 2,050 to 2,800 feet. Average annual precipitation is 25 to 35 inches, and average annual air temperature is 42 to 45 degrees F.

These soils are medial, nonacid, frigid Mollic Andaquepts.

Typical pedon of a Hoodoo silt loam in an area of Pywell-Hoodoo complex, 0 to 1 percent slopes; about 0.75 mile west of Kelso Lake, in Hoodoo Valley; about 2,000 feet east and 950 feet north of the southwest corner of sec. 20, T. 54 N., R. 3 W.

A11—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam, black (10YR 2/1) moist; strong fine granular structure; soft, very friable, slightly plastic; many very fine and fine roots and common medium roots; many very fine tubular pores; neutral (pH 6.8); clear wavy boundary.

A12—3 to 10 inches; dark grayish brown (10YR 4/2) silt loam, black (10YR 2/1) moist; strong medium subangular blocky structure parting to strong fine granular; soft, friable, slightly plastic; common very fine and few fine roots; many very fine tubular pores; neutral (pH 6.6); clear wavy boundary.

A13g—10 to 15 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; common fine distinct mottles that are dark brown (7.5YR 4/4) when moist; weak medium and coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common very fine roots; common very fine and few fine tubular pores; many medium pieces of charcoal; many large organic stains; neutral (pH 6.8); abrupt wavy boundary.

C1g—15 to 20 inches; light gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) moist; many medium distinct mottles that are dark brown (7.5YR 4/4) when moist; weak coarse angular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine roots; common very fine and few fine and medium tubular pores; few fine manganese concretions; neutral (pH 6.8); abrupt wavy boundary.

C2g—20 to 36 inches; white (10YR 8/2) silt loam, light brownish gray (2.5Y 6/2) moist; many large prominent mottles that are yellowish brown (10YR 5/6) when moist and many medium prominent mottles that are strong brown (7.5YR 5/6) when moist; massive; hard, firm, slightly plastic; few very fine roots; common very fine and few fine tubular pores; few fine manganese concretions and stains; slightly acid (pH 6.4); gradual wavy boundary.

C3g—36 to 42 inches; white (10YR 8/1) silt loam, light brownish gray (10YR 6/2) moist; common fine prominent mottles that are strong brown (7.5YR 5/6) when moist; massive; slightly hard, firm, slightly plastic; few very fine roots; common very fine and few fine tubular pores; few fine manganese concretions and stains; few fine iron stains; neutral (pH 6.6); gradual wavy boundary.

C4g—42 to 52 inches; white (10YR 8/1) very fine sandy loam, light brownish gray (10YR 6/2) moist; common fine distinct mottles that are yellowish brown (10YR 5/4) when moist; massive; slightly hard, firm, slightly plastic; few very fine roots; common very fine and few fine tubular pores; few fine iron stains; slightly acid (pH 6.4); abrupt smooth boundary.

IIC5g—52 to 60 inches; light gray (5Y 7/1) very cobbly silty clay loam, greenish gray (5GY 6/1) moist; few fine prominent mottles that are yellowish brown (10YR 5/4) when moist; massive; very hard, very firm, sticky and plastic; common very fine and few fine tubular pores; about 30 percent gravel and 30 percent cobbles; medium acid (pH 5.8); gradual wavy boundary.

IIC6g—60 to 65 inches; light gray (5Y 7/1) extremely gravelly silt loam, greenish gray (5GY 6/1) moist; few fine prominent mottles that are yellowish brown (10YR 5/4) when moist; massive; hard, firm, slightly sticky and slightly plastic; 60 percent gravel and 20 percent cobbles; medium acid (pH 5.8).

A seasonal high water table is at a depth of 1 foot to 2 feet from February to June. The profile is medium acid to neutral. The mollic epipedon is 7 to 16 inches thick.

A1 horizon: Hue is 10YR or 2.5Y, value is 4 to 6 when dry and 2 to 4 when moist, and chroma is 0 to 2 when moist or dry. Mottles have hue of 7.5YR or 10YR and chroma of 3 or 4 when moist. They are faint to prominent in the lower part of the horizon.

Cg horizon: Value is 6 to 8 when dry and 5 to 7 when moist. Texture is silt loam or very fine sandy loam. In some pedons, this horizon is stratified below a depth of 40 inches.

IICg horizon: The horizon is 30 to 60 percent gravel and 10 to 40 percent cobbles.

Hun series

The Hun series consists of deep and very deep, well drained soils on mountains. These soils formed in material weathered from granite, gneiss, and schist and have a mantle of volcanic ash and loess. Slope is 35 to 65 percent. Elevation is 3,600 to 5,400 feet. Average annual precipitation is 35 to 50 inches, and average annual air temperature is 40 to 43 degrees F.

These soils are loamy-skeletal, mixed Andic Cryochrepts.

Typical pedon of Hun gravelly silt loam, 35 to 65 percent slopes; about 4.5 miles east of Priest Lake, near Hunt Creek; about 2,800 feet south and 600 feet east of the northwest corner of sec. 4, T. 60 N., R. 3 W.

O1—2 inches to 0.5 inch; needles, leaves, twigs, and cones.

O2—0.5 inch to 0; decomposed organic matter.

B21ir—0 to 9 inches; light yellowish brown (10YR 6/4) gravelly silt loam, dark yellowish brown (10YR 4/4) moist; moderate medium and coarse subangular blocky structure parting to strong fine granular; soft, very friable, slightly plastic; many very fine and fine roots and common medium and coarse roots; many very fine and fine and common medium tubular pores; 25 percent gravel; medium acid (pH 6.0); clear wavy boundary.

IIB22—9 to 14 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; moderate medium and coarse subangular blocky structure; soft, very friable, slightly plastic; many very fine and fine roots and common medium roots; common very fine and fine tubular pores; 35 percent gravel and 15 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.

IIB3—14 to 25 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, dark brown (10YR 4/3) moist; weak medium and coarse subangular blocky structure; soft, very friable, slightly plastic; common very fine and fine roots and few medium roots; many very fine and common fine tubular pores; 35 percent gravel and 10 percent cobbles; slightly acid (pH 6.2); clear wavy boundary.

IIC1—25 to 55 inches; very pale brown (10YR 7/4) extremely cobbly loamy sand, light yellowish brown (10YR 6/4) moist; massive; slightly hard, friable; few very fine and fine roots; common very fine interstitial pores; 40 percent gravel, 20 percent cobbles, and 20 percent stones; medium acid (pH 6.0); gradual wavy boundary.

IICr—55 inches; fractured and weathered granite.

Bedrock is at a depth of 40 to 60 inches or more. Reaction is strongly acid to slightly acid. Some pedons have a discontinuous layer of light gray (10YR 7/1) volcanic ash 1.5 inches thick or less on the surface.

B2ir horizon: Value is 5 or 6 when dry and 3 or 4 when moist. Rock fragment content is 15 to 25 percent. Bulk density is 0.60 to 0.95 gram per cubic centimeter.

IIB horizon: Value is 5 or 6 when dry and 3 or 4 when moist. Rock fragment content is 35 to 60 percent.

IIC horizon: Hue is 10YR or 2.5Y, value is 7 or 8 when dry and 5 or 6 when moist, and chroma is 3 or 4 when moist or dry. Texture is very cobbly loamy sand, extremely cobbly loamy sand, or extremely cobbly coarse sand. Rock fragment content is 50 to 80 percent.

Jeru series

The Jeru series consists of very deep, well drained soils on mountains. These soils formed in colluvium and glacial till derived dominantly from granite, gneiss, and schist. Slope is 5 to 75 percent. Elevation is 3,600 to 6,000 feet. Average annual precipitation is 35 to 55 inches, and average annual air temperature is 40 to 43 degrees F.

These soils are loamy-skeletal, mixed Dystric Cryochrepts.

Typical pedon of Jeru very stony loam, 35 to 65 percent slopes; about 4 miles east of Priest Lake, near Sundance Mountain; about 300 feet east and 2,560 feet south of the northwest corner of sec. 5, T. 59 N., R. 3 W.

O1—1.5 inches to 1 inch; needles, leaves, and twigs.

O2—1 inch to 0; decomposed organic matter.

A1—0 to 6 inches; yellowish brown (10YR 5/4) very stony loam, dark yellowish brown (10YR 3/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots and few medium roots; many very fine interstitial pores and few fine tubular pores; 15 percent gravel; 4 percent stones on surface; slightly acid (pH 6.2); clear wavy boundary.

B2—6 to 23 inches; light yellowish brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine, common fine, and few medium roots; many very fine interstitial pores and few fine tubular pores; common very fine mica flakes; 15 percent gravel and 5 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.

B3—23 to 32 inches; very pale brown (10YR 7/4) very cobbly sandy loam, yellowish brown (10YR 5/4) moist; weak fine and medium subangular blocky structure; soft, very friable; many very fine and few fine roots; many very fine interstitial pores and common fine tubular pores; many very fine and common fine mica flakes; 20 percent cobbles and 20 percent gravel; neutral (pH 6.6); clear wavy boundary.

C1—32 to 62 inches; very pale brown (10YR 7/3) very stony sandy loam, brown (10YR 5/3) moist; massive; soft, very friable; few very fine and fine roots; common very fine interstitial pores and few fine tubular pores; many very fine and fine mica flakes and few medium mica flakes; 20 percent stones, 20 percent cobbles, and 20 percent gravel; neutral (pH 6.6).

Bedrock is at a depth of 60 inches or more. The solum is 27 to 40 inches thick. Stones cover 3 to 15 percent of the surface. The profile is medium acid to neutral. Base saturation is 5 to 35 percent. Some pedons have a discontinuous layer of light gray (10YR 7/1) volcanic ash 0.5 inch thick or less on the surface.

A1 horizon: Chroma is 2 to 4 when moist or dry. Texture is very stony loam or very stony sandy loam. Rock fragment content is 15 to 30 percent.

B horizon: Value is 5 to 7 when dry and 3 to 5 when moist, and chroma is 3 to 6 when moist or dry. Texture is gravelly loam, very gravelly loam, very gravelly sandy loam, or very cobbly sandy loam. Rock fragment content is 20 to 50 percent.

C horizon: Hue is 10YR or 2.5Y, value is 6 to 8 when dry and 4 to 6 when moist, and chroma is 2 to 4 when moist or dry. Texture is very gravelly, very cobbly, extremely cobbly, or very stony sandy loam or loamy sand. Rock fragment content is 40 to 85 percent.

Kaniksu series

The Kaniksu series consists of very deep, well drained soils on plains and terraces. These soils formed in glacial outwash material derived dominantly from granite, gneiss, and schist and have a mantle of loess and volcanic ash. Slope is 0 to 4 percent. Elevation is 2,100 to 2,600 feet. Average annual precipitation is 25 to 35 inches, and average annual air temperature is 43 to 45 degrees F.

These soils are sandy, mixed, frigid, Typic Xerochrepts.

Typical pedon of Kaniksu sandy loam, 0 to 4 percent slopes; about 5 miles northwest of Blanchard, west of State Highway 41; about 100 feet north and 600 feet west of the southeast corner of sec. 25, T. 55 N., R. 6 W.

O1—1 to 0.5 inch; needles, leaves, and twigs.

O2—0.5 inch to 0; decomposed organic matter.

A1—0 to 7 inches; pale brown (10YR 6/3) sandy loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure parting to weak fine granular; soft, very friable, slightly plastic; common very fine and fine roots and few medium roots; many very fine interstitial pores and common fine tubular pores; 5 percent gravel; slightly acid (pH 6.2); clear wavy boundary.

B21t—7 to 13 inches; light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine and common fine interstitial pores and few fine tubular pores; few thin clay films on faces of peds; 5 percent gravel; slightly acid (pH 6.4); clear wavy boundary.

B22t—13 to 19 inches; light yellowish brown (10YR 6/4) sandy loam, yellowish brown (10YR 5/4) moist; moderate fine and medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine and few fine interstitial and tubular pores; few thin clay films on faces of peds; 5 percent gravel; neutral (pH 6.6); clear wavy boundary.

B31t—19 to 26 inches; pale brown (10YR 6/3) gravelly loamy sand, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable; few very fine and fine roots; common very fine interstitial pores and few fine tubular pores; few thin clay films on faces of peds; 15 percent gravel; neutral (pH 6.8); clear wavy boundary.

B32t—26 to 47 inches; pale brown (10YR 6/3) gravelly loamy sand, dark brown (10YR 4/3) moist; massive; slightly hard, friable; few fine roots; common very fine interstitial pores and few very fine tubular pores; few thin clay bridges; 15 percent gravel; neutral (pH 7.0); clear wavy boundary.

C—47 to 60 inches; variegated gravelly sand; single grain; loose; many fine pores; 30 percent gravel; neutral (pH 7.0).

The solum is 38 to 50 inches thick.

A1 horizon: Value is 3 or 4 when moist, and chroma is 2 to 4 when dry or moist. Gravel content is 0 to 10 percent. Reaction is medium acid or slightly acid.

B2t horizon: Value is 6 or 7 when dry. Texture is sandy loam, fine sandy loam, gravelly sandy loam, or gravelly fine sandy loam. Gravel content is 0 to 25 percent. Reaction is slightly acid or neutral.

B3t horizon: Value is 6 or 7 when dry and 4 or 5 when moist, and chroma is 3 or 4 when dry or moist. In some pedons, this horizon is nongravelly. Rock fragment content is 5 to 20 percent. Reaction is slightly acid or neutral.

C horizon: In some pedons this horizon is nongravelly. Rock fragment content is 5 to 30 percent. Reaction is slightly acid or neutral.

Klootch series

The Klootch series consists of moderately deep, well drained soils on mountains. These soils formed in material derived from granite, gneiss, and schist and have a thin mantle of loess and volcanic ash. Slope is 15 to 65 percent. Elevation is 2,600 to 3,600 feet. Average annual precipitation is 35 to 45 inches, and average annual air temperature is 41 to 43 degrees F.

These soils are loamy-skeletal, mixed Dystric Cryochrepts.

Typical pedon of Klootch gravelly sandy loam, 35 to 65 percent slopes; about 0.25 mile east of Priest Lake, near Bear Creek Bay; about 4,100 feet north and 730 feet east of the southwest corner of sec. 10, T. 61 N., R. 4 W.

O1—1.5 inches to 0.5 inch; slightly decomposed needles, leaves, and twigs.

O2—0.5 inch to 0; highly decomposed needles, leaves, and twigs.

A1—0 to 5 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; moderate fine and medium granular structure; very soft, very friable, slightly plastic; common very fine and fine roots and few medium roots; common very fine and few fine tubular and interstitial pores; 30 percent gravel; slightly acid (pH 6.1); clear wavy boundary.

B21—5 to 11 inches; yellowish brown (10YR 5/6) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; moderate medium and coarse subangular blocky structure; soft, very friable; few very fine, fine, and medium roots; common very fine interstitial pores; 30 percent gravel and 10 percent cobbles; slightly acid (pH 6.3); gradual wavy boundary.

B22—11 to 26 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, yellowish brown (10YR 5/6) moist; moderate medium and coarse subangular blocky structure; soft, very friable; few fine and medium roots; common very fine interstitial pores; 50 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); abrupt wavy boundary.

R—26 inches; hard fractured granite.

Bedrock is at a depth of 20 to 40 inches. Stones cover 0 to 0.1 percent of the surface. The profile is medium acid to neutral. Base saturation is 35 to 58 percent. Some pedons have a discontinuous layer of light gray (10YR 7/1) volcanic ash 0.5 inch thick or less on the surface.

A1 horizon: Hue is 7.5YR or 10YR, value is 4 or 5 when dry, and chroma is 2 to 4 when dry or moist. Rock fragment content is 15 to 30 percent.

B2 horizon: Value is 3 to 5 when moist. Texture is very gravelly or very cobbly sandy loam or loam. Rock fragment content is 35 to 60 percent.

C horizon: This horizon is present only in some pedons. Texture commonly is extremely gravelly sandy loam or extremely cobbly sandy loam, but in some pedons it is very gravelly loamy sand. Rock fragment content is 60 to 85 percent. Hue is 10YR or 2.5Y, value is 6 to 8 when dry and 4 to 6 when moist, and chroma is 2 to 4 when dry or moist.

Kootenai series

The Kootenai series consists of very deep, well drained soils on terraces, recessional moraines, and terrace escarpments. These soils formed in glacial till and outwash derived dominantly from granite, gneiss, and schist and have a mantle of loess and volcanic ash. Slope is 0 to 55 percent. Elevation is 2,100 to 2,600 feet. Average annual precipitation is 25 to 30 inches, and average annual air temperature is 43 to 46 degrees F.

These soils are coarse-loamy over sandy or sandy-skeletal, mixed, frigid Typic Xerochrepts.

Typical pedon of a Kootenai gravelly silt loam (fig. 16) in an area of Kootenai-Bonner gravelly silt loams, 0 to 20 percent slopes; about 4.25 miles northwest of Athol; about 300 feet north and 2,200 feet west of the southeast corner of sec. 36, T. 54 N., R. 4 W.

O1—1 to 0.5 inch; undecomposed and partially decomposed needles, leaves, and twigs.

O2—0.5 inch to 0; decomposed organic matter.

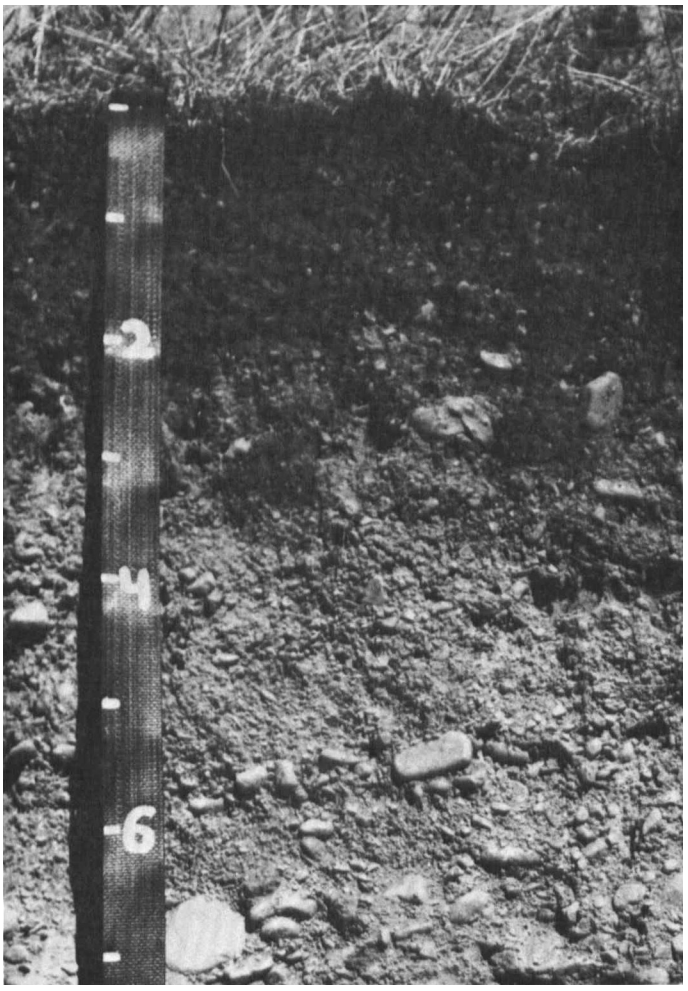


Figure 16.—Profile of Kootenai gravelly silt loam in an area of Kootenai-Bonner gravelly silt loams, 0 to 20 percent slopes. This soil formed in glacial drift and has a mantle of loess and volcanic ash.

A1—0 to 5 inches; grayish brown (10YR 5/2) gravelly silt loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; very soft, very friable, slightly plastic; many very fine and common fine roots; many very fine and few fine tubular pores; 25 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

B21—5 to 16 inches; yellowish brown (10YR 5/4) gravelly silt loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; soft, friable, slightly plastic; common very fine and fine roots; many very fine and few fine tubular pores; 30 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

B22t—16 to 22 inches; light yellowish brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, slightly plastic; common very fine and few fine roots; common very fine and few fine tubular pores; few thin clay films in pores; 30 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

B23t—22 to 26 inches; very pale brown (10YR 7/4) very gravelly sandy loam, yellowish brown (10YR 5/4) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly plastic; common very fine and few fine roots; common very fine and few fine tubular pores; few thin clay films in pores; 40 percent gravel and 5 percent cobbles; slightly acid (pH 6.5); abrupt wavy boundary.

IIC—26 to 60 inches; variegated extremely gravelly loamy coarse sand; single grain; loose; few very fine roots; many fine and medium pores; 70 percent gravel and 10 percent cobbles; slightly acid (pH 6.2).

The solum is 20 to 36 inches thick. The profile is medium acid to neutral.

A1 horizon: Value is 4 or 5 when dry and 3 or 4 when moist, and chroma is 2 to 4 when dry and 2 or 3 when moist. Rock fragment content is 15 to 30 percent. Bulk density is 0.85 to 0.95 gram per cubic centimeter. The A1 horizon is 4 to 6 inches thick.

B2 horizon: Hue is 10YR or 7.5YR, and chroma is 3 or 4 when moist or dry. Texture commonly is gravelly silt loam, gravelly loam, or gravelly sandy loam, but it is very gravelly or cobbly silt loam, loam, or sandy loam in some pedons. Rock fragment content is 25 to 45 percent but averages less than 35 percent. Bulk density is 0.95 to 1.30 gram per cubic centimeter. In some pedons, this horizon has a few thin clay films in the lower part.

IIC horizon: Texture is very gravelly, extremely gravelly, or very cobbly coarse sand or loamy coarse sand. Rock fragment content is 50 to 85 percent.

Kruse series

The Kruse series consists of very deep, well drained soils on mountains. These soils formed in material derived dominantly from gneiss and schist and have a mantle of loess and volcanic ash. Slope is 30 to 65 percent. Elevation is 2,200 to 3,800 feet. Average annual precipitation is 25 to 35 inches, and average annual air temperature is 43 to 45 degrees F.

These soils are fine-loamy, mixed, frigid Ultic Haploxeralfs.

Typical pedon of Kruse silt loam, 30 to 65 percent slopes, about 3 miles northwest of Spirit Lake, about 600 feet west and 2,600 feet north of the southeast corner of sec. 34, T. 54 N., R. 5 W.

O1—2 inches to 1 inch; needles, leaves, and twigs.

O2—1 inch to 0; highly decomposed organic matter.

A1—0 to 5 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure parting to weak fine granular; soft, very friable, slightly plastic; many very fine and fine roots and few medium and coarse roots; many very fine and few fine tubular and interstitial pores; neutral (pH 7.0); clear wavy boundary.

B1—5 to 15 inches; yellowish brown (10YR 5/4) silt loam, dark yellowish brown (10YR 3/4) moist; weak coarse subangular blocky structure parting to weak fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots and common medium and coarse roots; common very fine and few medium and coarse tubular and interstitial pores; neutral (pH 6.8); clear wavy boundary.

B21t—15 to 32 inches; light yellowish brown (10YR 6/4) silty clay loam, dark yellowish brown (10YR 4/6) moist; moderate medium prismatic structure parting to moderate medium and coarse subangular blocky; hard, firm, sticky and plastic; common very fine and fine roots and few medium roots; common very fine and few fine, medium, and coarse tubular and interstitial pores; common thin clay films on faces of peds and few thin clay films in pores; medium acid (pH 5.8); gradual wavy boundary.

B22t—32 to 51 inches; light brown (7.5YR 6/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium prismatic structure parting to moderate medium and coarse subangular blocky; hard, firm, sticky and plastic; few fine and medium roots; common very fine and fine and few medium tubular and interstitial pores; common thin clay films on faces of peds and few moderately thick clay films in pores; 5 percent gravel; medium acid (pH 5.8); clear wavy boundary.

B3t—51 to 60 inches; pink (7.5YR 7/4) gravelly clay loam, brown (7.5YR 5/4) moist; weak coarse subangular blocky structure; hard, firm, sticky and plastic; few fine roots; few very fine interstitial pores; common thin clay bridges; 15 percent gravel; medium acid (pH 6.0).

Bedrock is at a depth of 60 inches or more. The solum is 40 to 60 inches thick.

A1 horizon: Value is 4 to 6 when dry and 2 to 4 when moist, and chroma is 2 to 4 when dry or moist. Fine gravel content is 0 to 10 percent. Reaction is medium acid to neutral.

B1 horizon: Value is 5 to 7 when dry and 3 or 4 when moist, and chroma is 3 or 4 when dry and 3 to 6 when moist. Texture is loam or silt loam. Fine gravel content is 0 to 10 percent. Reaction is medium acid to neutral.

B2t horizon: Value is 6 or 7 when dry and 4 or 5 when moist, and chroma is 3 to 6 when dry or moist. Texture is silty clay loam, clay loam, or heavy loam. Gravel content

is 0 to 15 percent. Reaction is medium acid or slightly acid.

B3 horizon: Hue is 10YR or 7.5YR, value is 6 or 7 when dry and 4 or 5 when moist, and chroma is 4 to 6 when dry or moist. Texture is clay loam, loam, sandy loam, gravelly clay loam, gravelly loam, or gravelly sandy loam. Rock fragment content is 0 to 30 percent. Reaction is medium acid or slightly acid.

C horizon: This horizon is present only in some pedons. Rock fragment content is 15 to 35 percent.

Kruse Variant

The Kruse Variant consists of moderately deep, well drained soils on mountain foot slopes. These soils formed in material derived from granite and have a mantle of volcanic ash and loess. Slope is 5 to 20 percent. Elevation is 2,500 to 3,000 feet. Average annual precipitation is 35 to 40 inches, and average annual air temperature is 41 to 43 degrees F.

These soils are fine-loamy, mixed Typic Paleboralfs.

Typical pedon of Kruse Variant silt loam, 5 to 20 percent slopes; about 0.25 mile east of Priest Lake, near Two Mouth Creek; about 1,120 feet north and 1,660 feet west of southeast corner of sec. 22, T. 62 N., R. 4 W.

O1—2 inches to 1 inch; slightly decomposed needles, leaves, twigs, and moss.

O2—1 inch to 0; highly decomposed needles, leaves, twigs, and moss.

A1—0 to 2 inches; yellowish brown (10YR 5/4) silt loam, dark yellowish brown (10YR 3/4) moist; weak very fine and fine granular structure; soft, friable, slightly plastic; many very fine and fine roots, common medium roots, and few coarse roots; many very fine and few fine interstitial pores; 10 percent gravel; strongly acid (pH 5.4); clear wavy boundary.

B21ir—2 to 10 inches; light yellowish brown (10YR 6/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure parting to weak very fine granular; soft, friable, slightly plastic; many very fine and fine roots, common medium roots, and few coarse roots; many very fine and few fine interstitial pores; 10 percent gravel; strongly acid (pH 5.4); clear wavy boundary.

IIB22—10 to 28 inches; very pale brown (10YR 7/3) very gravelly sandy loam, yellowish brown (10YR 5/4) moist; weak fine and medium subangular blocky structure; slightly hard, firm, slightly plastic; common very fine and fine roots and few medium roots; common very fine and few fine tubular pores; 30 percent gravel and 25 percent cobbles; strongly acid (pH 5.4); clear wavy boundary.

IIB23t—28 to 38 inches; yellow (10YR 7/6) gravelly sandy clay loam, yellowish brown (10YR 5/6) moist; moderate fine and medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few very fine roots; many very fine and few fine tubular pores; 30 percent gravel; few moderately thick clay films on faces of peds and lining pores; strongly acid (pH 5.4); clear wavy boundary.

IICr—38 inches; weathered granite.

Bedrock is at a depth of 20 to 40 inches. The profile is strongly acid or medium acid. Some pedons have a discontinuous layer of light gray (10YR 7/1) volcanic ash 0.25 inch thick or less at the surface.

A1 horizon: Value is 5 or 6 when dry and 3 or 4 when moist. Gravel content is 5 to 15 percent.

B2ir horizon: Value is 6 or 7 when dry and 4 or 5 when moist. Texture is silt loam or loam. Gravel content is 5 to 15 percent.

IIB2 horizon: Value is 6 or 7 when dry and 4 or 5 when moist. Texture is gravelly loam, gravelly sandy loam, very gravelly loam, or very gravelly sandy loam. Rock fragment content is 25 to 55 percent.

IIB2t horizon: Value is 6 or 7 when dry, and chroma is 4 to 6 moist or dry, Rock fragment 15 to 35 percent.

IIC horizon: This horizon is present only in some pedons. Value is 6 or 7 when dry and 5 or 6 when moist. Texture is gravelly sandy loam or very gravelly sandy loam. Rock fragment content is 30 to 55 percent.

Lenz series

The Lenz series consists of moderately deep, well drained soils on mountains. These soils formed in material derived from granite, gneiss, and schist and have small amounts of loess in the upper part. Slope is 30 to 65 percent. Elevation is 2,500 to 4,000 feet. Average annual precipitation is 25 to 35 inches, and average annual air temperature is 46 to 48 degrees F.

These soils are loamy-skeletal, mixed, mesic Ultic Haploxerolls.

Typical pedon of a Lenz stony sandy loam in an area of Lenz-Rock outcrop association, 30 to 65 percent slopes, about 2.25 miles southeast of Vay, about 900 feet east and 350 feet north of the southwest corner of sec. 20, T. 55 N., R. 3 W.

O1—0.5 inch to 0; leaves and twigs.

A1—0 to 7 inches; dark grayish brown (10YR 4/2) stony sandy loam, very dark brown (10YR 2/2) moist; strong fine granular structure; soft, very friable, slightly plastic; common very fine, fine, medium, and coarse roots; many very fine and fine and few medium tubular pores; 25 percent gravel and 5 percent cobbles; stones cover about 0.1 percent of surface; slightly acid (pH 6.2); clear wavy boundary.

B2—7 to 16 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure parting to strong fine granular; soft, very friable, slightly plastic; common very fine, fine, medium, and coarse roots; many very fine and fine and few medium tubular pores; 40 percent gravel and 5 percent cobbles; medium acid (pH 6.0); clear wavy boundary.

B3—16 to 24 inches; very pale brown (10YR 7/3) extremely gravelly sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, slightly plastic; common very fine and fine and few medium roots; many very fine and fine and few medium tubular pores; 65 percent gravel and 5 percent cobbles; medium acid (pH 6.0); abrupt wavy boundary.

R—24 inches; fractured granite.

Bedrock is at a depth of 20 to 40 inches. Stones cover 0.01 to 0.1 percent of the surface. The profile is medium acid or slightly acid. Base saturation is 50 to 75 percent.

A1 horizon: Value is 4 or 5 when dry and 2 or 3 when moist, and chroma is 2 or 3 when dry and 1 or 2 moist. Rock fragment content is 15 to 30 percent.

B horizon: Value is 5 to 7 when dry and 3 to 5 when moist, and chroma is 3 or 4 when moist or dry. Texture is very gravelly sandy loam, extremely gravelly sandy loam, or very gravelly loam. In some pedons this horizon is very stony or very cobbly in the lower part. Rock fragment content is 40 to 80 percent.

C horizon: This horizon is present only in some pedons. Texture is extremely cobbly sandy loam or extremely stony sandy loam.

Melder series

The Melder series consists of deep and very deep, well drained soils on mountains. These soils formed in material derived from granite, gneiss, and schist and have a mantle of loess and volcanic ash. Slope is 15 to 65 percent. Elevation is 2,200 to 4,000 feet. Average annual precipitation is 25 to 35 inches, and average annual air temperature is 46 to 48 degrees F.

These soils are loamy-skeletal, mixed, mesic Mollic Haploxeralfs.

Typical pedon of Melder loam, 35 to 65 percent slopes; about 2 miles west of Blanchard, near the Idaho-Washington border; about 700 feet west and 900 feet south of the northeast corner of sec. 24, T. 54 N., R. 6 W.

O1—0.5 inch to 0; needles, leaves, and twigs.

A11—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots and few medium roots; many very fine interstitial pores and common fine tubular pores; 10 percent gravel; slightly acid (pH 6.4); clear wavy boundary.

A12—5 to 9 inches; pale brown (10YR 6/3) loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium roots; many very fine interstitial pores and common fine tubular pores; 10 percent gravel; slightly acid (pH 6.4); clear wavy boundary.

B1—9 to 14 inches; light yellowish brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium roots; common very fine interstitial pores and common fine tubular pores; 15 percent gravel; neutral (pH 6.6); clear wavy boundary.

B21t—14 to 19 inches; very pale brown (10YR 7/4) gravelly loam, yellowish brown (10YR 5/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; common very fine interstitial pores and few fine tubular pores; few thin clay films on faces of peds; clay band that is 1/16 inch thick and is yellowish red (5YR 5/6) when moist; 25 percent gravel and 5 percent cobbles; neutral (pH 6.8); clear wavy boundary.

B22t—19 to 33 inches; very pale brown (10YR 7/4) very gravelly heavy loam, yellowish brown (10YR 5/4) moist; strong medium and coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; common very fine interstitial pores and common fine tubular pores; common moderately thick clay films on faces of peds and in pores; three clay bands that are 1/4 inch thick and are yellowish red (5YR 5/6) when moist; 35 percent gravel and 5 percent cobbles; neutral (pH 6.8); clear wavy boundary.

B3t—33 to 68 inches; very pale brown (10YR 7/4) very gravelly sandy loam, yellowish brown (10YR 5/4) moist; moderate fine and medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; common fine and few medium tubular pores; common moderately thick clay films on faces of peds and in pores; five clay bands that are 1/4 inch thick and are yellowish red (5YR 5/6) when moist; 40 percent gravel and 10 percent cobbles; medium acid (pH 6.0) abrupt wavy boundary.

Cr—68 inches; weathered granite.

Bedrock is at a depth of 40 to 60 inches or more. The profile is medium acid to neutral.

A1 horizon: Value is 4 to 6 when dry and 2 to 4 when moist, and chroma is 2 or 3 when dry or moist. Gravel content is 5 to 15 percent.

B2t horizon: Hue is 10YR or 7.5YR, value is 6 or 7 when dry and 4 or 5 when moist, and chroma is 3 to 6 when dry or moist. Texture is gravelly, very gravelly, or extremely gravelly loam, heavy loam, or clay loam. Rock fragment content is 30 to 70 percent. Base saturation is 75 to 85 percent.

C horizon: This horizon is present only in some pedons. Texture is very cobbly, extremely cobbly, or very stony coarse sandy loam, sandy loam, or loamy coarse sand.

Mission series

The Mission series consists of somewhat poorly drained soils that are shallow to a fragipan and are on terraces. These soils formed in silty glacial lake-laid sediment derived from mixed sources and have a mantle of volcanic ash and loess. Slope is 0 to 30 percent. Elevation is 2,050 to 2,500 feet. Average annual precipitation is 28 to 35 inches, and average annual air temperature is 43 to 45 degrees F.

These soils are medial, frigid Ochreptic Fragixeralfs.

Typical pedon of Mission silt loam, 0 to 2 percent slopes, about 3 miles north of Sandpoint, Idaho; about 1,870 feet south and 2,275 feet west of the northeast corner of sec. 3, T. 57 N., R. 2 W.

O1—2 inches to 1 inch; needles, leaves, and twigs.

O2—1 inch to 0; decomposed organic matter.

A1—0 to 2 inches; grayish brown (10YR 5/2) silt loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure parting to weak fine granular; soft, very friable, slightly plastic; many very fine roots and few fine to coarse roots; many very fine, common fine, and few medium tubular pores; neutral (pH 6.8); clear wavy boundary.

B21ir—2 to 6 inches; yellowish brown (10YR 5/4) silt loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; soft, very friable, slightly plastic; common very fine roots and few fine to coarse roots; common very fine and few fine tubular pores; slightly acid (pH 6.5); clear wavy boundary.

B22ir—6 to 11 inches; light yellowish brown (10YR 6/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, slightly plastic; many very fine roots and common fine, medium, and coarse roots; common very fine and fine and few medium tubular pores; slightly acid (pH 6.1); abrupt wavy boundary.

IIB23tx—11 to 20 inches; mottled, light gray (10YR 7/2) and pale brown (10YR 6/3) heavy silt loam, grayish brown (10YR 5/2) and brown (10YR 5/3) moist; weak very coarse prismatic structure parting to weak coarse angular blocky; very hard, very firm, slightly sticky and plastic; dense and somewhat brittle; few very fine and fine flattened roots on peds; common very fine and fine and few medium tubular pores; common moderately thick clay films on faces of peds and lining pores; medium acid (pH 6.0); abrupt wavy boundary.

IIA'2—20 to 32 inches; light gray (2.5Y 7/2) silt, light brownish gray (2.5Y 6/2) moist; common fine and medium faint mottles that are yellowish brown (10YR 5/4) when moist; massive; hard, firm, slightly plastic; few very fine, fine, and medium roots; many very fine, common fine, and few medium tubular pores; few thin clay films as bridges; medium acid (pH 6.0); abrupt smooth boundary.

IIB'21t—32 to 44 inches; light yellowish brown (10YR 6/4) heavy silt loam, yellowish brown (10YR 5/6) moist; weak very coarse prismatic structure parting to weak coarse angular blocky; very hard, very firm, slightly sticky and plastic; few very fine and fine flattened roots on peds; common very fine and fine and few medium tubular pores; common thick white (10YR 8/2) silt coatings, light gray (10YR 7/2) moist, on faces of peds; common moderately thick clay films on faces of peds and lining pores; strongly acid (pH 5.2); abrupt smooth boundary.

IIB'22t—44 to 47 inches; pale yellow (2.5Y 7/4) silty clay loam, light yellowish brown (10YR 6/4) moist; weak very coarse angular blocky structure; very hard, very firm, sticky and plastic; common very fine and few fine flattened roots on peds; common very fine and few fine tubular pores; common thick white (2.5Y 8/2) silt coatings, light gray (10YR 7/2) moist, on faces of peds; common thick clay films on faces of peds and lining pores; few moderately thick manganese stains; strongly acid (pH 5.2); abrupt smooth boundary.

IIIC1—47 to 49 inches; pale yellow (2.5Y 7/4) very fine sandy loam, grayish brown (2.5Y 5/2) moist; few fine faint mottles that are light olive brown (2.5Y 5/4) when moist; massive; slightly hard, friable, slightly plastic; few very fine roots; common very fine tubular pores; strongly acid (pH 5.5); abrupt smooth boundary.

IVC2—49 to 67 inches; light yellowish brown (2.5Y 6/4) fine sand, grayish brown (2.5Y 5/2) moist; massive; loose; few very fine, fine, and medium roots; many fine pores; four firm very fine sandy loam bands that are 1/4 inch thick and are yellowish brown (10YR 5/4) when moist; slightly acid (pH 6.3).

The fragipan is at a depth of 10 to 20 inches. A seasonal perched water table is at a depth of 6 to 18 inches from February to May.

A1 horizon: Value is 4 or 5 when dry and 2 to 4 when moist, and chroma is 2 to 4 when moist or dry. Reaction is slightly acid or neutral. Bulk density is 0.60 to 0.85 gram per cubic centimeter.

B2ir horizon: Hue is 10YR or 7.5YR. Reaction is medium acid to neutral. Bulk density is 0.65 to 0.85 gram per cubic centimeter.

IIB2tx horizon: Hue is 10YR or 2.5Y, value is 6 to 8 when dry and 4 to 6 when moist, and chroma is 2 to 4 when moist or dry. Texture is heavy silt loam, silt loam, or silty clay loam. Mottles have hue of 10YR or 2.5Y, and they have chroma of 2 to 4 when moist. Reaction is medium acid to neutral. Bulk density is 1.70 to 1.80 grams per cubic centimeter.

IIA'2 horizon: Hue is 10YR, 2.5Y, or 5Y, value is 7 or 8 when dry and 5 or 6 when moist, and chroma is 2 to 4 when moist or dry. Texture is silt, silt loam, or very fine sandy loam. Mottles have chroma of 2 to 4 when moist. Reaction is medium acid or slightly acid.

IIB'2t horizon: Hue is 10YR, 2.5Y, or 5Y, value is 6 to 8 when dry and 4 to 6 when moist, and chroma is 2 to 4 when dry and 2 to 6 when moist. Texture is heavy silt loam, silty clay loam, or silty clay. Mottles have hue of 7.5YR, 10YR, 2.5Y, or 5Y, and they have chroma of 1 to 8 when moist. Reaction is strongly acid to neutral.

IIIC and IVC horizons: Hue is 2.5Y or 5Y, value is 6 to 8 when dry and 4 to 6 when moist, and chroma is 2 to 4 when moist or dry. Texture is stratified very fine sandy loam, silt loam, silty clay loam, silty clay, fine sand, and loamy fine sand. Mottles have chroma of 2 to 8 when moist. They are faint or distinct. Reaction is strongly acid to mildly alkaline.

Moscow series

The Moscow series consists of moderately deep, well drained soils on mountains. These soils formed in material derived from granite, gneiss, and schist and have a mantle of volcanic ash and loess. Slope is 35 to 65 percent. Elevation is 2,600 to 3,800 feet. Average annual precipitation is 30 to 35 inches, and average annual air temperature is 43 to 45 degrees F.

These soils are coarse-loamy, mixed, frigid Andic Xerochrepts.

Typical pedon of a Moscow loam in an area of Vassar-Moscow association, 35 to 65 percent slopes; about 3.3 miles northwest of Spirit Lake, near Spring Creek; about 1,100 feet north and 900 feet west of the southeast corner of sec. 34, T. 54 N., R. 5 W.

O1—1 to 0.5 inch; needles, leaves, and twigs.
O2—0.5 inch to 0; highly decomposed organic matter.
A1—0 to 2 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure parting to moderate fine granular; soft, very friable, slightly plastic; many very fine and fine roots; many very fine and fine interstitial pores; slightly acid (pH 6.5); abrupt wavy boundary.
B21—2 to 6 inches; yellowish brown (10YR 5/4) loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly plastic; common very fine and fine roots and few medium roots; many very fine and fine interstitial pores; 5 percent gravel; slightly acid (pH 6.5); clear wavy boundary.
B22—6 to 19 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; soft, friable, slightly plastic; common very fine and fine roots and few medium and coarse roots; many very fine and fine interstitial pores and few very fine tubular pores; 5 percent gravel; slightly acid (pH 6.5); clear wavy boundary.
IIB3—19 to 26 inches; very pale brown (10YR 7/4) sandy loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly plastic; common fine and medium roots and few coarse roots; common very fine tubular and interstitial pores; 10 percent gravel; medium acid (pH 6.0); abrupt wavy boundary.
IICr—26 inches; weathered and fractured schist.

Bedrock is at a depth of 20 to 40 inches. The profile is strongly acid to slightly acid. Base saturation is 35 to 55 percent. Bulk density is 0.85 to 0.95 gram per cubic centimeter at a depth of as much as 14 inches.

A1 horizon: Value is 4 to 6 when dry and 2 to 4 when moist, and chroma is 2 or 3 when dry or moist. Gravel content is 0 to 15 percent.

B2 horizon: Hue is 10YR or 7.5YR, value is 5 to 7 when dry and 4 or 5 when moist, and chroma is 3 to 6 when dry or moist. Texture commonly is loam or silt loam, but it is gravelly loam or gravelly silt loam in some pedons. Rock fragment content is 5 to 20 percent.

IIB3 horizon: Chroma is 3 or 4 when dry or moist. This horizon is gravelly in some pedons. Rock fragment content is 10 to 30 percent.

IIC horizon: This horizon, where present, is gravelly sandy loam or gravelly coarse sandy loam.

Odenson series

The Odenson series consists of very deep, poorly drained soils in lower lying areas of terraces. These soils formed in silty glacial lake-laid sediment derived from mixed sources and have a mantle of loess and volcanic ash. Slope is 0 to 2 percent. Elevation is 2,120 to 2,240

feet. Average annual precipitation is 32 to 34 inches, and average annual air temperature is 43 to 45 degrees F.

These soils are fine-silty, mixed, frigid Andaqueptic Haplaquolls.

Typical pedon of Odenson silt loam, 0 to 2 percent slopes (fig. 17), about 0.5 mile north of Ponderay and State Highway 200; about 1,925 feet west and 2,750 feet north of the southeast corner of sec. 2, T. 57 N., R. 2 W.

A11—0 to 4 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium granular structure; soft, friable, slightly plastic; many very fine, fine, and medium roots; many very fine and fine tubular pores; neutral (pH 7.0); clear wavy boundary.

A12—4 to 8 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse subangular blocky structure parting to weak fine and medium granular; soft, friable, slightly plastic; many very fine, common fine, and few medium roots; many very fine and fine tubular pores; neutral (pH 7.2); abrupt wavy boundary.

A13—8 to 9 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly plastic; many very fine, common fine, and few medium roots; many very fine and few fine tubular pores; mildly alkaline (pH 7.5); abrupt broken boundary.

IIB21g—9 to 18 inches; mixed white (2.5Y 8/2) and pale yellow (2.5Y 7/4) silty clay loam, light brownish gray (2.5Y 6/2) and light olive brown (2.5Y 5/4) moist; common fine distinct mottles that are yellowish brown (10YR 5/4 and 5/6) when moist; moderate very coarse prismatic structure parting to weak medium and coarse angular blocky; hard, firm, sticky and plastic; common very fine and few fine roots; many very fine and few fine tubular pores; few fine iron and manganese concretions; two 3-inch root channels of silt loam that is very dark grayish brown (10YR 3/2) when moist; mildly alkaline (pH 7.8); clear wavy boundary.

IIB22gca—18 to 35 inches; mixed white (5Y 8/2) and pale yellow (2.5Y 7/4) silty clay loam, light olive gray (5Y 6/2) and light olive brown (2.5Y 5/4) moist; many fine and medium prominent mottles that are greenish gray (5GY 6/1) and yellowish brown (10YR 5/6 and 5/8) when moist; moderate very coarse prismatic structure parting to weak medium and coarse angular blocky; hard, firm, sticky and plastic; few very fine and fine roots; many very fine and fine and common medium tubular pores; few fine manganese stains and many fine and medium iron stains; few medium irregular soft masses of lime; slightly effervescent; moderately alkaline (pH 8.0); clear irregular boundary.

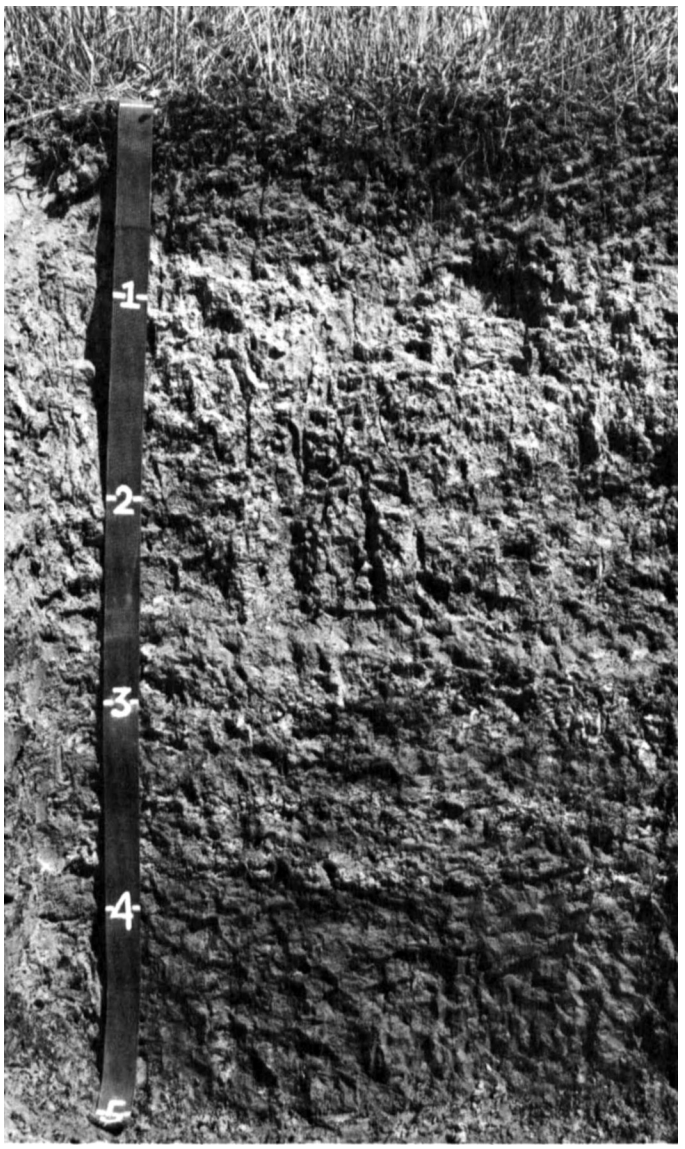


Figure 17.—Profile of Odenson silt loam, 0 to 2 percent slopes. This very deep soil formed in silty glacial lake-laid sediment.

IIIC1g—35 to 46 inches; pale yellow (2.5Y 7/4) silt loam, light olive brown (2.5Y 5/4) moist; many medium and coarse prominent mottles that are light gray (5Y 6/1) when moist and are surrounded by 3-milimeters-thick bands of iron stains that are yellowish brown (10YR 5/6) when moist; massive;

hard, firm, slightly plastic; few very fine roots; many very fine and fine tubular pores; common fine manganese concretions and stains; moderately alkaline (pH 8.0); clear wavy boundary.

IVC2gca—46 to 57 inches; pale yellow (2.5Y 8/4) silty clay, light yellowish brown (2.5Y 6/4) moist; many medium and coarse prominent mottles that are light gray (5Y 6/1), yellowish brown (10YR 5/6), and brownish yellow (10YR 6/6) when moist; thin platy structure; very hard, very firm, very sticky and very plastic; common very fine roots; many very fine and fine tubular pores; common medium manganese stains; many large irregular lime concretions; violently effervescent; moderately alkaline (pH 8.0); abrupt wavy boundary.

VC3g—57 to 60 inches; pale yellow (2.5Y 7/4) very fine sandy loam, light olive brown (2.5Y 5/4) moist; many medium and coarse prominent mottles that are light gray (5Y 6/1), yellowish brown (10YR 5/6), and brownish yellow (10YR 6/6) when moist; massive; soft, friable, slightly plastic; common very fine and few fine tubular pores; common fine and medium manganese stains; moderately alkaline (pH 8.0); abrupt wavy boundary.

VIC4gca—60 to 62 inches; pale yellow (2.5Y 8/4) silty clay, light yellowish brown (2.5Y 6/4) moist; common medium and coarse distinct mottles that are light olive gray (5Y 6/2) and brownish yellow (10YR 6/6) when moist; very hard, very firm, very sticky and very plastic; common very fine and few fine tubular pores; common fine manganese stains; many fine and medium irregular lime concretions and soft lime masses; violently effervescent; moderately alkaline (pH 8.0); abrupt wavy boundary.

VIIC5g—62 to 65 inches; pale yellow (2.5Y 7/4) silt loam, light olive brown (2.5Y 5/4) moist; common medium and coarse distinct mottles that are light olive gray (5Y 6/2) and brownish yellow (10YR 6/6) when moist; hard, firm, slightly sticky and slightly plastic; few very fine and fine tubular pores; common fine manganese stains; moderately alkaline (pH 8.0).

A seasonal high water table is at a depth of 6 to 24 inches from February to June. The solum is 28 to 40 inches thick.

A1 horizon: Value is 4 or 5 when dry and 2 or 3 when moist, and chroma is 2 or 3 when moist or dry. Reaction is slightly acid to mildly alkaline.

IIB2g horizon: Chroma is 1 to 4 when moist or dry. Texture is silt loam or silty clay loam. Clay content is 18 to 35 percent. Mottles have chroma of 1 to 8. In some pedons, this horizon does not have soft lime masses. Reaction is mildly alkaline or moderately alkaline.

Cg horizon: Hue is 5Y, 2.5Y, or 5GY, and chroma is 1 to 4 when moist or dry. Texture is stratified silt loam, silty clay loam, silty clay, and very fine sandy loam. Mottles have chroma of 1 to 8. In some pedons, this horizon does not have lime concretions.

Pend Oreille series

The Pend Oreille series consists of very deep, well drained soils on glaciated foothills and mountainsides. These soils formed in glacial till derived dominantly from granitic and metamorphic rock and have a mantle of volcanic ash and loess. Slope is 5 to 45 percent. Elevation is 2,100 to 3,600 feet. Average annual precipitation is 25 to 35 inches, and average annual air temperature is 42 to 45 degrees F.

These soils are medial over loamy, mixed, frigid Andic Xerochrepts.

Typical pedon of Pend Oreille silt loam, 5 to 45 percent slopes; about 5.8 miles west of U.S. Highway 95 on Springy Point Road, and 1 mile south of junction of Springy Point Road and first county road; about 1,300 feet west and 50 feet south of the northeast corner of sec. 7, T. 56 N., R. 2 W.

O11—2 inches to 1 inch; slightly decomposed needles and twigs.

O12—1 inch to 0; moderately decomposed needles and twigs.

A1—0 to 4 inches; light yellowish brown (10YR 6/4) silt loam, dark yellowish brown (10YR 3/4) moist; weak fine subangular blocky structure parting to strong very fine granular; soft, very friable, slightly plastic; many very fine, fine, and medium roots; many very fine interstitial pores; 10 percent gravel; neutral (pH 6.6); clear wavy boundary.

B21ir—4 to 13 inches; light yellowish brown (10YR 6/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure parting to strong very fine granular; soft, very friable, slightly plastic; many very fine, fine, and medium roots; many very fine interstitial pores; 10 percent gravel; slightly acid (pH 6.1); clear wavy boundary.

B22ir—13 to 17 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; soft, friable, slightly plastic; common very fine, fine, and medium roots; many very fine interstitial pores; 5 percent gravel; slightly acid (pH 6.1); clear wavy boundary.

IIB31t—17 to 28 inches; pale brown (10YR 6/3) gravelly sandy loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable; common very fine, fine, and

medium roots; many fine tubular pores; few thin clay films bridging mineral grains; 20 percent gravel and 5 percent cobbles and stones; medium acid (pH 6.0); clear wavy boundary.

IIB32t—28 to 41 inches; pale brown (10YR 6/3) gravelly sandy loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable; common very fine and fine roots; many fine tubular pores; few thin clay films bridging mineral grains; 20 percent gravel and 5 percent cobbles and stones; slightly acid (pH 6.3); clear wavy boundary.

IIC—41 to 60 inches; very pale brown (10YR 7/3) very cobbly sandy loam, brown (10YR 5/3) moist; massive; slightly hard, friable; common very fine and fine roots; many fine tubular pores; 15 percent gravel and 20 percent cobbles and stones; slightly acid (pH 6.4).

The solum is 36 to 48 inches thick. The profile is medium acid to neutral. Some pedons have a discontinuous layer of light gray volcanic ash 0.5 inch thick or less at the surface.

A1 horizon: Value is 5 or 6 when dry. Rock fragment content is 0 to 15 percent.

B2ir horizon: Hue is 10YR or 7.5YR, and chroma is 3 or 4 when moist or dry. Texture is silt loam or loam. In some pedons, this horizon is gravelly. Rock fragment content is 0 to 25 percent. Bulk density is 0.85 to 0.95 gram per cubic centimeter at a depth of 14 inches or more.

IIB3t horizon: Hue is 2.5Y or 10YR, value is 6 or 7 when dry and 4 or 5 when moist, and chroma is 3 or 4 when moist or dry. Texture is gravelly sandy loam or cobbly sandy loam. Rock fragment content is 15 to 35 percent. In some pedons this horizon is somewhat dense and faintly mottled.

IIC horizon: Hue is 2.5Y or 10YR, value is 7 or 8 when dry and 5 or 6 when moist, and chroma is 2 to 4 when moist or dry. Texture is gravelly, cobbly, very gravelly, or very cobbly sandy loam. Rock fragment content is 25 to 50 percent.

Priestlake series

The Priestlake series consists of very deep, well drained soils on mountains. These soils formed in glacial till derived dominantly from granite, gneiss, and schist and have a mantle of loess and volcanic ash. Slope is 15 to 65 percent. Elevation is 2,400 to 5,000 feet. Average annual precipitation is 35 to 45 inches, and average annual air temperature is 40 to 44 degrees F.

These soils are sandy-skeletal, mixed Dystric Cryochrepts.

Typical pedon of Priestlake gravelly sandy loam, 35 to 65 percent slopes; about 0.1 mile east of Priest Lake, south of Horton Creek; about 800 feet north and 380 feet west of the southeast corner of sec. 3, T. 60 N., R. 4 W.

O1—1.5 inches to 1 inch; undecomposed and partially decomposed needles, leaves, twigs, and moss.

O2—1 inch to 0; decomposed organic matter.

A11—0 to 7 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure parting to strong fine granular; soft, very friable, slightly plastic; many very fine and fine roots, common medium roots and few coarse roots; many very fine and common fine tubular pores; 20 percent gravel; slightly acid (pH 6.2); gradual wavy boundary.

A12—7 to 12 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; moderate medium and coarse subangular blocky structure; soft, very friable, slightly plastic; common very fine and fine roots and few medium and coarse roots; many very fine and common fine tubular pores; 25 percent gravel; slightly acid (pH 6.2); clear wavy boundary.

B2—12 to 23 inches; very pale brown (10YR 7/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, slightly plastic; common very fine and fine roots and few medium and coarse roots; many very fine and common fine tubular pores; 35 percent gravel; slightly acid (pH 6.2); abrupt wavy boundary.

IIB31t—23 to 32 inches; very pale brown (10YR 7/3) very gravelly loamy sand, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable; common very fine and fine roots and few medium and coarse roots; many very fine and common fine tubular and interstitial pores; 45 percent gravel; few thin clay films bridging mineral grains; medium acid (pH 6.0); clear wavy boundary.

IIB32t—32 to 43 inches; very pale brown (10YR 8/3) extremely cobbly loamy sand, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable; few very fine and fine roots; many very fine and common fine tubular and interstitial pores; 40 percent gravel, 30 percent cobbles, and 10 percent stones; few fine manganese stains on faces of peds; common thin clay films bridging mineral grains; medium acid (pH 6.0); clear wavy boundary.

IIB33t—43 to 52 inches; white (10YR 8/2) very gravelly loamy sand, light yellowish brown (10YR 6/4) moist; massive; slightly hard, friable; common very fine and fine roots and few medium roots; many very fine and common fine interstitial pores; common thin clay films bridging mineral grains; 35 percent gravel and

20 percent cobbles; slightly acid (pH 6.2); clear wavy boundary.

IIB34t—52 to 60 inches; very pale brown (10YR 8/3) very gravelly loamy sand, light yellowish brown (10YR 6/4) moist; massive; hard, firm; few very fine and fine roots; common very fine and fine interstitial pores; 35 percent gravel and 15 percent cobbles; common thin clay films bridging mineral grains; slightly acid (pH 6.2).

The profile is medium acid to neutral. Base saturation is 30 to 55 percent. Some pedons have a discontinuous layer of light gray (10YR 7/1) volcanic ash 0.5 inch thick or less at the surface.

A horizon: Value is 5 or 6 when dry and 3 or 4 when moist. Rock fragment content is 15 to 25 percent.

B2 horizon: Value is 5 to 7 when dry and 3 to 5 when moist. Texture is gravelly sandy loam, gravelly coarse sandy loam, very gravelly sandy loam, or very gravelly coarse sandy loam. Rock fragment content is 25 to 40 percent.

IIB3t horizon: Texture is very gravelly, very cobbly, or extremely cobbly loamy sand. Rock fragment content is 40 to 80 percent. In some pedons, this horizon has a very hard, dense layer below a depth of 40 inches.

IIC horizon: This horizon is present only in some pedons. Texture is very gravelly, very cobbly, or extremely cobbly sand or coarse sand.

Prouty series

The Prouty series consists of moderately deep, well drained soils on mountains. These soils formed in material derived dominantly from granite, gneiss, and schist and have a mantle of volcanic ash and loess. Slope is 35 to 65 percent. Elevation is 5,000 to 6,400 feet. Average annual precipitation is 45 to 55 inches, and average annual air temperature is 39 to 42 degrees F.

These soils are loamy-skeletal, mixed Andic Cryochrepts.

Typical pedon of Prouty gravelly loam, 35 to 65 percent slopes; about 2.75 miles east of Cavanaugh Bay, on Priest Lake and near Cougar Creek; about 800 feet south and 700 feet west of the northeast corner of sec. 19, T. 60 N., R. 3 W.

O1—1.5 inches to 0.5 inch; needles, leaves, and twigs.

O2—0.5 inch to 0; decomposed organic matter.

A1—0 to 6 inches; yellowish brown (10YR 5/4) gravelly loam, dark brown (10YR 3/3) moist; moderate fine and medium granular structure; soft, very friable, slightly plastic; many very fine and fine roots, common medium roots and few coarse roots; many very fine and fine and common medium tubular pores; 20 percent gravel; strongly acid (pH 5.4); clear wavy boundary.

B2—6 to 18 inches; yellowish brown (10YR 5/4) gravelly loam, dark yellowish brown (10YR 3/4) moist; moderate medium and coarse subangular blocky structure; soft, very friable, slightly plastic; many very fine and fine roots and few medium and coarse roots; many very fine, common fine, and few medium tubular pores; 30 percent gravel; strongly acid (pH 5.4); clear wavy boundary.

IIB3—18 to 24 inches; light yellowish brown (10YR 6/4) extremely stony sandy loam, dark brown (10YR 4/3) moist; weak medium and coarse subangular blocky structure; soft, very friable, slightly plastic; common very fine, fine, and medium roots; many very fine and common fine tubular pores; 40 percent gravel, 10 percent cobbles, and 25 percent stones; strongly acid (pH 5.4); gradual wavy boundary.

IIC—24 to 37 inches; light gray (2.5Y 7/2) extremely stony sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; soft, very friable; common very fine and fine roots; common very fine and few fine tubular pores; 45 percent gravel, 10 percent cobbles, and 20 percent stones; common mica flakes; strongly acid (pH 5.4); clear wavy boundary.

IICr—37 inches; fractured and weathered granite.

Bedrock is at a depth of 20 to 40 inches. The profile is strongly acid or medium acid. Bulk density is 0.85 to 0.95 gram per cubic centimeter at a depth of 14 inches or more. Some pedons have a discontinuous layer of light gray (10YR 7/1) volcanic ash 1 inch thick or less at the surface.

A1 horizon: Chroma is 3 or 4 when moist. Rock fragment content is 15 to 25 percent.

B2 horizon: Value is 5 or 6 when dry and 3 or 4 when moist. Rock fragment content is 15 to 30 percent.

IIB3 horizon: Texture is very gravelly, very cobbly, extremely stony, or very stony sandy loam. Rock fragment content is 45 to 75 percent. Bulk density is 1.30 to 1.60 grams per cubic centimeter.

IIC horizon: Texture is very gravelly, very cobbly, extremely stony, or very stony sandy loam. Rock fragment content is 45 to 75 percent. Hue is 2.5Y or 10YR, value is 6 or 7 when dry and 4 or 5 when moist, and chroma is 2 to 4 when moist or dry.

Pywell series

The Pywell series consists of very deep, very poorly drained soils in depressional areas on bottom lands,

drainageways, and flood plains. These soils formed in organic material derived dominantly from herbaceous plants and some woody material. Slope is 0 to 1 percent. Elevation is 2,050 to 3,000 feet. Average annual precipitation is 25 to 35 inches, and average annual air temperature is 42 to 45 degrees F.

These soils are euic Typic Borosaprists.

Typical pedon of a Pywell muck (fig. 21) in an area of Pywell-Hoodoo complex, 0 to 1 percent slopes, about 1 mile west of Kelso Lake, near Hoodoo Creek; about 750 feet east and 1,890 feet north of the southwest corner of sec. 20, T. 54 N., R. 3 W.

Oa1—0 to 2 inches; sapric material (muck) that is very dark gray (10YR 3/1) on broken face and black (10YR 2/1) when rubbed; about 25 percent primarily herbaceous fibers, about 10 percent after rubbing; moderate fine and medium granular structure; friable, slightly plastic; many very fine, common fine, and few medium roots; about 30 percent mineral material; neutral (pH 7.0); clear wavy boundary.

Oa2—2 to 9 inches; sapric material that is black (10YR 2/1) on broken face and when rubbed; about 35 percent primarily herbaceous fibers, about 15 percent after rubbing; moderate fine and medium subangular blocky structure; friable, slightly plastic; common very fine and fine roots and few medium roots; about 35 percent mineral material; 1/4-inch-thick discontinuous layer of dark brown (7.5YR 3/2) silt loam at lower edge of horizon; slightly acid (pH 6.5); abrupt wavy boundary.

Oa3—9 to 15 inches; sapric material that is very dark gray (5YR 3/1) on broken face and when rubbed; about 15 percent primarily herbaceous fibers, less than 5 percent after rubbing; weak medium and coarse subangular blocky structure; firm, slightly plastic; few very fine and fine roots; about 10 percent mineral material; many reddish shiny coatings in pores and on faces of peds; slightly acid (pH 6.2); clear wavy boundary.

Oa4—15 to 21 inches; sapric material that is mottled, dark reddish brown (5YR 3/3) and black (7.5YR N/2) on broken face and mottled, dark reddish brown (5YR 3/2) and black (10YR 2/1) when rubbed; about 40 percent fibers that are primarily herbaceous, about 5 percent after rubbing; massive; firm, slightly plastic; few very fine and fine roots; about 15 percent mineral material; slightly acid (pH 6.2); clear wavy boundary.

Oa5—21 to 28 inches; sapric material that is black (2.5Y N/2) on broken face and when rubbed; about 35 percent primarily herbaceous fibers, about 5 percent after rubbing; massive; firm; few very fine and fine roots; about 5 percent mineral material; about 15 percent wood fragments; medium acid (pH 5.8); gradual wavy boundary.

Oa6—28 to 42 inches; sapric material that is dark reddish brown (5YR 3/3) on broken face and dark reddish brown (5YR 3/2) when rubbed; about 40 percent primarily herbaceous fibers, about 5 percent after rubbing; massive; firm, slightly plastic; few very fine and fine roots; about 5 percent mineral material; about 15 percent wood fragments; medium acid (pH 5.8); clear wavy boundary.

Oe1—42 to 60 inches; hemic material that is dark reddish brown (5YR 3/3) on broken face and dark reddish brown (5YR 3/2) when rubbed; about 75 percent primarily herbaceous fibers, about 25 percent after rubbing; massive; friable; less than 5 percent mineral material; about 35 percent wood fragments; medium acid (pH 5.8).

A high water table is at the surface to a depth of 4 feet from January to December. The organic material is more than 52 inches thick. It is primarily derived from herbaceous plants, but in some pedons it is as much as 35 percent woody fibers in the lower part. The profile is neutral to strongly acid.

The surface tier is mostly sapric material, but some pedons have a thin layer of fibric or hemic material or a thin, discontinuous layer of volcanic ash or other mineral material. Hue is 10YR to 5YR or is neutral, value is 2 to 4 when moist, and chroma is 0 to 2 when moist.

The subsurface tier is mostly sapric material, but some pedons have a thin layer of hemic material or a thin, discontinuous layer of volcanic ash or other mineral material. Hue is 5YR to 2.5Y or is neutral, value is 2 to 4 when moist, and chroma is 0 to 4 when moist.

The bottom tier is mostly sapric material, but some pedons have a thin layer of mineral material or volcanic ash and varying amounts of hemic material and woody or herbaceous fibers. Hue is 5YR, 7.5YR, or neutral, value is 2 to 4 when moist, and chroma is 0 to 4 when moist.

Most of the Pywell soils in this survey area are taxajuncts to the Pywell series because they have hemic material in the bottom tier. This difference, however, does not significantly effect use and management.

Rathdrum series

The Rathdrum series consists of very deep, well drained soils in swales and depressional areas on glacial outwash terraces. These soils formed in alluvium derived dominantly from windblown volcanic ash. Slope is 0 to 8 percent. Elevation is 2,100 to 2,600 feet. Average annual precipitation is 25 to 35 inches, and average annual air temperature is 42 to 45 degrees F.

These soils are ashy, frigid Typic Vitrandepts.

Typical pedon of a Rathdrum silt loam in an area of Rathdrum-Bonner silt loams, 0 to 8 percent slopes; about 2.25 miles northeast of the town of Spirit Lake;

about 2,030 feet west and 910 feet north of the southeast corner of sec. 34, T. 54 N., R. 4 W.

O1—2 inches to 1 inch; undecomposed and partially decomposed needles, leaves, twigs, bark, and moss.
O2—1 inch to 0; highly decomposed and humified organic material.
B21ir—0 to 17 inches; light yellowish brown (10YR 6/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; soft, very friable; common very fine and fine roots and few medium and coarse roots; common very fine and few fine tubular pores; occasional krotovinas 2 to 4 inches in diameter; few white silt coatings on faces of peds; many fine iron concretions; many very fine and fine, common medium, and few large pieces of charcoal; slightly acid (pH 6.2); gradual wavy boundary.
B22ir—17 to 38 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; soft, very friable; common very fine and fine roots and few medium and coarse roots; few very fine and common fine tubular pores; few white silt coatings on faces of peds and many fine and few medium white silt concretions; common very fine and fine and few medium pieces of charcoal; many fine and few medium iron stains and concretions; slightly acid (pH 6.2); diffuse wavy boundary.
C1—38 to 55 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; massive; soft, very friable; common very fine and fine roots and few medium roots; common very fine and fine tubular pores; common white silt coatings bridging mineral grains; many fine and few medium iron stains and concretions; many fine and few medium white silt concretions; few medium and large pieces of charcoal; slightly acid (pH 6.2); gradual wavy boundary.
C2—55 to 64 inches; very pale brown (10YR 7/4) silt loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable; few very fine, fine, and medium roots; common very fine and fine tubular pores; common white silt coatings on faces of peds; many fine and few medium iron stains; slightly acid (pH 6.4).

The solum is 18 to 40 inches thick. The profile is medium acid to neutral. Some pedons have a discontinuous layer of light gray (10YR 7/1) volcanic ash 1 inch thick or less at the surface.

A1 horizon: This horizon is present only in some pedons. Chroma is 2 to 4 when moist or dry.

B2ir horizon: Value is 5 to 7 when dry and 3 to 5 when moist, and chroma is 3 or 4 when dry or moist. Texture is silt loam or very fine sandy loam. Fine gravel content is 0 to 10 percent. Bulk density is 0.60 to 0.95 gram per cubic centimeter. The horizon is 60 to 75 percent vitric volcanic ash.

C horizon: Value is 6 to 8 when dry and 4 to 6 when moist. Texture is silt loam or very fine sandy loam. Coarse fragment content is 0 to 30 percent in the lower part.

Sagle series

The Sagle series consists of very deep, somewhat poorly drained soils on toe slopes and foot slopes. These soils formed in glacial till derived dominantly from granitic and metamorphic rock. They have a mantle of volcanic ash and loess. Slope is 5 to 30 percent. Elevation is 2,200 to 3,000 feet. Average annual precipitation is 28 to 35 inches, and average annual air temperature is 43 to 46 degrees F.

These soils are medial over loamy-skeletal, mixed, frigid Aquic Dystric Xerochrepts.

Typical pedon of Sagle silt loam, 5 to 30 percent slopes, about 0.75 mile west of Cocolalla Lake, about 1,525 feet south and 910 feet west of the northeast corner of sec. 13, T. 55 N., R. 3 W.

O1—2 inches to 1 inch; needles, leaves, and twigs.
O2—1 inch to 0; decomposed organic matter.
A1—0 to 11 inches; yellowish brown (10YR 5/4) silt loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly plastic; common very fine, fine, medium, and coarse roots; common very fine and fine tubular and interstitial pores; neutral (pH 6.8); clear wavy boundary.
B21irt—11 to 15 inches; light yellowish brown (10YR 6/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common very fine and fine tubular and interstitial pores; few thin clay films on faces of peds; 5 percent gravel; medium acid (pH 6.0); clear wavy boundary.
B22—15 to 21 inches; very pale brown (10YR 7/4) gravelly silt loam, yellowish brown (10YR 5/4) moist; common fine faint mottles that are yellowish brown (10YR 5/6) when moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common very fine and few fine tubular and interstitial pores; 15 percent gravel; medium acid (pH 5.6); abrupt wavy boundary.

IIB31tg—21 to 26 inches; mixed very pale brown (10YR 7/3) and light gray (2.5Y 7/2) very gravelly sandy loam, mixed light yellowish brown (10YR 6/4) and light brownish gray (2.5Y 6/2) moist; many fine and medium faint and distinct mottles that are yellowish brown (10YR 5/6 and 5/8) when moist; weak coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and fine and few medium tubular and interstitial pores; few thin clay films as bridges; common very fine manganese accumulations; 40 percent gravel and 5 percent cobbles; strongly acid (pH 5.5); clear wavy boundary.

IIB32tg—26 to 60 inches; mixed very pale brown (10YR 8/3) and white (2.5Y 8/2 and 5Y 8/1) extremely gravelly sandy loam, mixed light yellowish brown (10YR 6/4), light brownish gray (2.5Y 6/2), and light gray (5Y 7/1) moist; many fine and medium distinct and prominent mottles that are strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) when moist; massive; very hard, very firm, slightly sticky and slightly plastic; few very fine matted roots; common very fine and fine tubular and interstitial pores; common moderately thick clay films as bridges; common very fine manganese accumulations; 40 percent gravel, 15 percent cobbles, and 10 percent stones; strongly acid (pH 5.5).

A seasonal high water table is at a depth of 2.0 to 3.5 feet from February to June.

A1 horizon: Reaction is slightly acid or neutral. Bulk density is 0.65 to 0.85 gram per cubic centimeter.

B21irt horizon: Hue is 7.5YR or 10YR, value is 5 or 6 when dry and 3 or 4 when moist, and chroma is 3 or 4 when moist or dry. Rock fragment content is 0 to 10 percent. Reaction is medium acid or slightly acid. Bulk density is 0.85 to 0.95 gram per cubic centimeter at a depth of 14 inches or more.

B22 horizon: Value is 6 or 7 when dry and 4 or 5 when moist, and chroma is 3 or 4 when moist or dry. Texture is gravelly silt loam or very gravelly silt loam. Rock fragment content is 15 to 45 percent. Reaction is medium acid or slightly acid. Bulk density is 0.85 to 1.25 gram per cubic centimeter.

IIB3tg horizon: Value is 6 to 8 when dry and 4 to 7 when moist. Texture is very gravelly sandy loam, extremely gravelly sandy loam, or very cobbly sandy loam. Mottles have value of 4 to 6 when moist. Rock fragment content is 35 to 70 percent. Reaction is strongly acid or medium acid.

Selle series

The Selle series consists of very deep, well drained soils on terraces and dunes. These soils formed in sandy glacial lake-laid sediment that has been reworked by wind. They have a thin mantle of loess and volcanic ash. Slope is 0 to 12 percent. Elevation is 2,050 to 2,500 feet. Average annual precipitation is 28 to 35 inches, and average annual air temperature is 42 to 45 degrees F.

These soils are sandy, mixed, frigid Dystric Xerochrepts.

Typical pedon of Selle fine sandy loam, 0 to 8 percent slopes; about 0.25 mile east of U.S. Highway 95, behind Colburn School; about 1,160 feet south and 1,100 feet west of the northeast corner of sec. 12, T. 58 N., R. 2 W.

O11—3 to 2.5 inches; undecomposed needles and twigs.

O12—2.5 inches to 1 inch; mat of partially decomposed needles and twigs and some fungi.

O2—1 inch to 0; highly decomposed organic matter.

A1—0 to 5 inches; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 3/4) moist; moderate very fine granular structure; soft, very friable; many very fine roots and common fine, medium, and coarse roots; many very fine interstitial pores; medium acid (pH 6.0); gradual smooth boundary.

B21—5 to 14 inches; light yellowish brown (10YR 6/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak very fine granular structure; soft, very friable; many very fine, fine, medium, and coarse roots; common fine tubular pores and many very fine interstitial pores; very few semihard manganese accumulations 2 to 3 millimeters in diameter; medium acid (pH 5.8); gradual smooth boundary.

B22—14 to 20 inches; light yellowish brown (10YR 6/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable; many very fine, fine, medium, and coarse roots; common fine and few medium tubular pores and many very fine interstitial pores; very few hard manganese accumulations 1 millimeter to 2 millimeters in diameter; medium acid (pH 6.0); gradual smooth boundary.

B31t—20 to 34 inches; light yellowish brown (10YR 6/4) loamy fine sand, dark yellowish brown (10YR 4/4) moist; massive; soft, friable; common very fine and fine roots; common fine tubular pores and many very fine interstitial pores; few wavy discontinuous clayey bands about 2 millimeters thick; few dark brown soft iron accumulations 1 millimeter to 2 millimeters in diameter; medium acid (pH 6.0); gradual smooth boundary.

B32t—34 to 45 inches; light yellowish brown (10YR 6/4) loamy fine sand, dark brown (10YR 4/3) moist; single grain; loose; few fine roots; common fine tubular pores and many very fine interstitial pores;

several wavy discontinuous clayey bands about 2 millimeters thick; few dark brown soft iron accumulations 1 millimeter to 2 millimeters in diameter; medium acid (pH 5.8); gradual smooth boundary.

B33t—45 to 60 inches; light yellowish brown (10YR 6/4) loamy fine sand, olive brown (2.5Y 4/4) moist; single grain; loose; few very fine roots; few fine tubular pores and many very fine interstitial pores; several wavy discontinuous clayey bands about 2 millimeters thick; few light gray splotches; few reddish brown soft iron accumulations 1 millimeter to 3 millimeters in diameter; medium acid (pH 5.8).

The profile is medium acid to neutral. Base saturation is 30 to 60 percent. Some pedons have a layer of light gray volcanic ash 1/4 to 1/2 inch on the surface.

A1 horizon: Value is 4 or 5 when dry, and chroma is 3 or 4 when dry and 2 to 4 when moist.

B2 horizon: Hue is 10YR or 7.5YR, value is 5 to 7 when dry, and chroma is 3 or 4 when moist. Texture is fine sandy loam or sandy loam.

B3t horizon: Hue is 10YR, 2.5Y, or variegated, and value is 6 or 7 when dry and 4 or 5 when moist. Texture is loamy fine sand, fine sand, or sand. Fine gravel content is 0 to 5 percent.

Treble series

The Treble series consists of very deep, well drained soils on foot slopes, foothills and mountainsides. These soils formed in glacial till derived dominantly from granite, gneiss, and schist. They have a thin mantle of loess and volcanic ash. Slope is 5 to 65 percent. Elevation is 2,200 to 4,000 feet. Average annual precipitation is 25 to 38 inches, and average annual air temperature is 42 to 46 degrees F.

These soils are loamy-skeletal, mixed, frigid Dystric Xerochrepts.

Typical pedon of a Treble gravelly sandy loam in an area of Treble-Rock outcrop association, 20 to 65 percent slopes, about 0.75 mile northeast of Clagstone; about 1,900 feet west and 800 feet north of the southeast corner of sec. 14, T. 54 N., R. 4 W.

O1—0.75 to 0.25 inch; needles, leaves, and twigs.

O2—0.25 inch to 0; decomposed organic matter.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) gravelly sandy loam, very dark gray (10YR 3/1) moist; moderate fine granular structure; soft, very friable, slightly plastic; many very fine roots and common fine and medium roots; many very fine and fine and common medium tubular pores; 25 percent gravel; slightly acid (pH 6.2); clear wavy boundary.

B21—2 to 7 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure parting to moderate fine granular; soft, friable, slightly plastic; many very fine, common fine, and few medium roots; many very fine, common fine, and few medium tubular pores; 30 percent gravel; slightly acid (pH 6.2); gradual wavy boundary.

B22—7 to 18 inches; light yellowish brown (10YR 6/4) very gravelly coarse sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure parting to moderate fine granular; soft, friable, slightly plastic; many very fine roots, common fine and medium roots, and few coarse roots; many very fine, common fine, and few medium tubular pores; 40 percent gravel; medium acid (pH 6.0); clear wavy boundary.

B23—18 to 27 inches; light yellowish brown (10YR 6/4) very gravelly coarse sandy loam, dark yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; slightly hard, friable; common very fine and few fine roots; many very fine and few fine tubular pores; 45 percent gravel and 10 percent cobbles; medium acid (pH 6.0); clear wavy boundary.

IIC1—27 to 36 inches; variegated very gravelly loamy coarse sand; single grain; loose; few very fine and fine roots; many very fine interstitial pores; 40 percent gravel and 5 percent cobbles; medium acid (pH 6.0); gradual wavy boundary.

IIC2—36 to 60 inches; variegated very gravelly loamy coarse sand; single grain; loose; few very fine and fine roots; many very fine interstitial pores; 45 percent gravel, 10 percent stones, and 5 percent cobbles; medium acid (pH 6.0).

The solum is 24 to 34 inches thick. The profile is medium acid to neutral.

A1 horizon: Value is 4 or 5 when dry and 2 or 3 when moist, and chroma is 1 to 3 when moist or dry. Rock fragment content is 15 to 25 percent.

B2 horizon: Chroma is 3 or 4 when moist or dry. Rock fragment content is 25 to 55 percent. In some pedons this horizon has a few clay bridges or clay bands in the lower part.

IIC horizon: Texture is very gravelly, extremely gravelly, very cobbly, or very stony loamy coarse sand, coarse sandy loam, or sandy loam. Rock fragment content is 40 to 80 percent. In some pedons this horizon has a few clay bridges or clay bands in the upper part.

Vassar series

The Vassar series consists of deep and very deep, well drained soils on mountains. These soils formed in material derived from granite, gneiss, and schist and have a thick mantle of volcanic ash. Slope is 30 to 65

percent. Elevation is 2,600 to 4,000 feet. Average annual precipitation is 30 to 40 inches, and average annual air temperature is 41 to 43 degrees F.

These soils are medial over loamy, mixed Entic Cryandepts.

Typical pedon of Vassar silt loam, 30 to 65 percent slopes, about 3 miles northwest of the town of Spirit Lake; about 300 feet north and 1,700 feet east of the southwest corner of sec. 35, T. 54 N., R. 5 W.

O1—2 inches to 1 inch; needles, leaves, twigs, and moss.
O2—1 inch to 0; decomposed organic matter.
A1—0 to 1 inch; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium granular structure; soft, very friable, slightly plastic; many very fine and fine roots, common medium roots, and few coarse roots; many very fine tubular pores; neutral (pH 7.0); abrupt wavy boundary.
B21ir—1 inch to 7 inches; yellowish brown (10YR 5/4) silt loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure parting to weak fine granular; soft, very friable, slightly plastic; many very fine and fine roots, common medium roots, and few coarse roots; many very fine tubular pores; neutral (pH 6.8); gradual wavy boundary.
B22ir—7 to 21 inches; light yellowish brown (10YR 6/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure parting to weak fine granular; soft, very friable, slightly plastic; common very fine and fine roots and few medium and coarse roots; common very fine tubular pores; slightly acid (pH 6.4); abrupt wavy boundary.
IIB31t—21 to 39 inches; very pale brown (10YR 7/4) gravelly sandy loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly plastic; common very fine and fine roots and few medium and coarse roots; common very fine and fine tubular pores; few thin clay films lining pores; 15 percent gravel and 10 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.
IIB32t—39 to 50 inches; very pale brown (10YR 8/3) cobbly sandy loam, light yellowish brown (10YR 6/4) moist; weak coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine and medium roots; common very fine and fine tubular pores; few thin clay films lining pores; 15 percent gravel and 15 percent cobbles; medium acid (pH 6.0); clear wavy boundary.
IICr—50 inches; weathered schist

Bedrock is at a depth of 40 inches to more than 60 inches. The profile is medium acid to neutral. Some pedons have a layer of light gray volcanic ash 0.5 inch thick or less on the surface.

A1 horizon: Value is 4 or 5 when dry and 2 or 3 when moist, and chroma is 2 or 3 when dry or moist. Fine gravel content is 0 to 5 percent.

B2ir horizon: Hue is 10YR or 7.5YR, and chroma is 3 or 4 when dry and 3 to 6 when moist. Texture is silt loam or very fine sandy loam. Gravel content is 0 to 15 percent.

IIB3t horizon: Hue is 10YR or 7.5YR, value is 6 to 8 when dry and 4 to 6 when moist, and chroma is 3 or 4 when dry or moist. Rock fragment content is 15 to 35 percent.

Vay series

The Vay series consists of deep and very deep, well drained soils on mountains. These soils formed in material derived from granite, gneiss, and schist and have a thick mantle of volcanic ash. Slope is 20 to 65 percent. Elevation is 3,200 to 5,600 feet. Average annual precipitation is 35 to 50 inches, and average annual air temperature is 40 to 43 degrees F.

These soils are medial over loamy-skeletal, mixed Entic Cryandepts.

Typical pedon of Vay silt loam in an area of Vay-Ardtoo association, 35 to 65 percent slopes (fig. 18); about 2 miles southeast of Vay; about 2,300 feet west and 2,100 feet south of the northeast corner of sec. 20, T. 55 N., R. 3 W.

O1—2 inches to 1 inch; needles, leaves, and twigs.
O2—1 inch to 0; decomposed organic matter.
A1—0 to 6 inches; yellowish brown (10YR 5/4) silt loam, dark yellowish brown (10YR 3/4) moist; moderate medium subangular blocky structure parting to strong fine granular; soft, very friable, slightly plastic; many very fine and fine roots and common medium and coarse roots; many very fine and common fine tubular pores; medium acid (pH 6.0); clear wavy boundary.
B21ir—6 to 16 inches; light yellowish brown (10YR 6/4) gravelly silt loam, dark yellowish brown (10YR 4/4) moist; moderate medium and coarse subangular blocky structure; soft, very friable, slightly plastic; many very fine and fine roots and common medium and coarse roots; many very fine and common fine tubular pores; 20 percent gravel; medium acid (pH 6.0); abrupt wavy boundary.
IIB22—16 to 25 inches; pale brown (10YR 6/3) very gravelly loam, dark brown (10YR 4/3) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly plastic; common very fine roots and few fine, medium, and coarse roots; many very fine and common fine tubular pores; 40 percent gravel; medium acid (pH 6.0); clear wavy boundary.
IIIB3t—25 to 42 inches; very pale brown (10YR 8/3) extremely gravelly coarse sandy loam, pale brown (10YR 6/3) moist; massive; slightly hard, friable; few

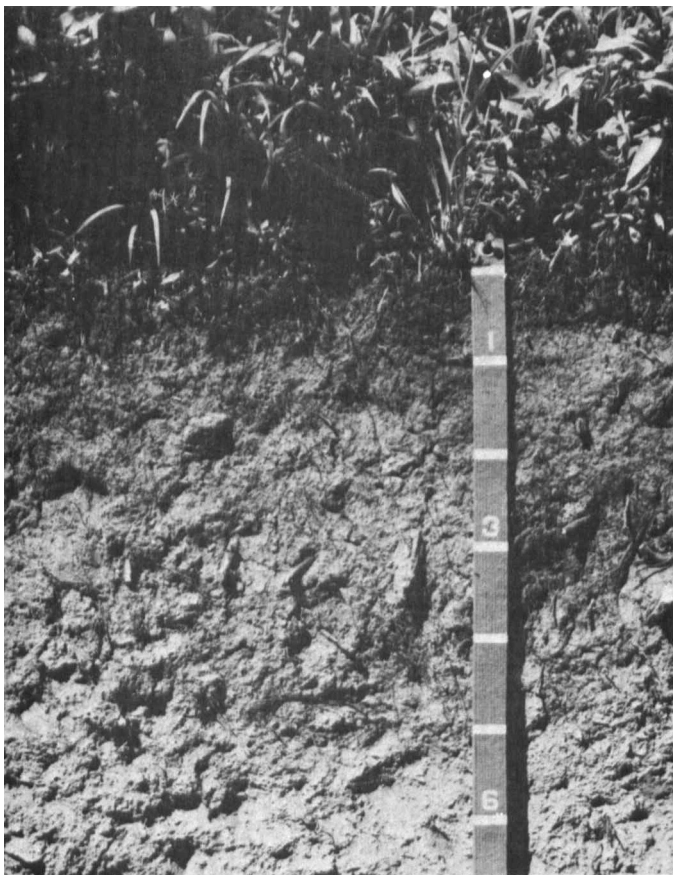


Figure 18.—Profile of Vay silt loam. The upper 16 inches is mainly volcanic ash.

very fine and fine roots; many very fine, common fine, and few medium tubular pores; 60 percent gravel and 5 percent cobbles; two clay bands 1.5 and 0.25 inch thick; slightly acid (pH 6.2); gradual wavy boundary.

IIICr—42 inches; weathered granite.

Bedrock is at a depth of 40 inches to more than 60 inches. The profile is medium acid to neutral. Some pedons have a layer of light gray volcanic ash 0.5 inch thick or less on the surface.

A1 horizon: Chroma is 2 to 4 when dry or moist. Texture is silt loam or gravelly silt loam. Gravel content is 0 to 20 percent.

B2ir horizon: Hue is 10YR or 7.5YR, value is 5 to 7 when dry and 3 or 4 when moist, and chroma is 3 to 6 when dry or moist. Texture is silt loam, gravelly silt loam, or cobbly silt loam. Rock fragment content is 0 to 30 percent.

IIB2 horizon: Chroma is 3 or 4 when dry or moist. Texture is very gravelly or very cobbly loam or sandy loam. Rock fragment content is 35 to 60 percent.

IIIB3t horizon: Hue is 10YR, 7.5YR, or 2.5Y, value is 6 to 8 when dry and 4 to 6 when moist, and chroma is 3 or 4 when dry or moist. Texture commonly is extremely gravelly, very cobbly, or very stony coarse sandy loam. In some pedons texture is very gravelly or very cobbly loamy coarse sand in the lower part. Rock fragment content is 40 to 80 percent.

Wrencoe series

The Wrencoe series consists of very deep, very poorly drained soils on low stream terraces, flood plains, and bottom lands. These soils formed in lake-laid sediment derived from mixed sources. Slope is 0 to 2 percent. Elevation is 2,050 to 2,100 feet. Average annual precipitation is 30 to 35 inches, and average annual air temperature is 42 to 45 degrees F.

These soils are fine, mixed, frigid Typic Haplaquolls.

Typical pedon of Wrencoe silty clay, 0 to 2 percent slopes, about 0.3 mile north of Seneacquoteen, near the Pend Oreille River; about 1,600 feet east and 1,900 feet north of the southwest corner of sec. 31, T. 56 N., R. 3 W.

O1—0.5 inch to 0; grass, roots, stems, and leaves.

A11—0 to 5 inches; mixed gray (10YR 5/1) and grayish brown (10YR 5/2) silty clay, very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) moist; strong fine and medium subangular blocky structure parting to strong fine and medium granular; hard, firm, sticky and very plastic; many very fine, common fine, and few medium roots; common very fine and few fine and medium tubular pores; slightly acid (pH 6.2); clear wavy boundary.

A12—5 to 10 inches; grayish brown (10YR 5/2) silty clay, very dark grayish brown (10YR 3/2) moist; few fine distinct mottles that are dark yellowish brown (10YR 4/4) when moist; moderate medium and coarse subangular blocky structure; hard, firm, sticky and very plastic; common very fine roots and few fine and medium roots; common very fine and few fine tubular pores; common fine and medium iron and manganese stains; slightly acid (pH 6.2); gradual wavy boundary.

B21g—10 to 15 inches; mixed gray (10YR 6/1) and light brownish gray (10YR 6/2) silty clay, dark gray and dark grayish brown (10YR 4/1, 4/2) moist; common medium distinct mottles that are dark yellowish brown (10YR 4/4) when moist; moderate coarse subangular blocky structure; hard, firm, sticky and very plastic; few very fine, fine, and medium roots; many very fine and few fine tubular pores; common fine and medium iron and manganese stains; slightly acid (pH 6.2); clear wavy boundary.

B22tg—15 to 23 inches; mixed light gray (10YR 7/1) and light brownish gray (10YR 6/2) silty clay, dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) moist; common medium distinct mottles that are dark yellowish brown (10YR 4/4) when moist; weak coarse prismatic structure parting to moderate coarse angular blocky; very hard, very firm, very sticky and very plastic; few very fine roots; many very fine and few fine and medium tubular pores; few moderately thick clay films in pores; common medium and large iron and manganese stains; slightly acid (pH 6.5); clear wavy boundary.

B23tg—23 to 36 inches; mixed light gray (10YR 7/1) and white (10YR 8/1) silty clay, grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) moist; many fine and medium distinct mottles that are yellowish brown (10YR 5/4) when moist; moderate very coarse prismatic structure; very hard, very firm, very sticky and very plastic; few very fine and fine roots; common very fine and few fine tubular pores; common moderately thick clay films on faces of peds; common medium and large iron and manganese stains; pressure faces are evident as peds dry out; neutral (pH 6.8); gradual wavy boundary.

B24tg—36 to 50 inches; mixed light gray (10YR 7/1) and white (10YR 8/1) silty clay, gray, (10YR 5/1) grayish brown, (10YR 5/2) and light brownish gray (10YR 6/2) moist; many fine and medium distinct mottles that are yellowish brown (10YR 5/6) when moist; weak very coarse prismatic structure; very hard, very firm, very sticky and very plastic; few very fine roots; common very fine and few fine tubular pores; common moderately thick clay films in pores and as bridges; common medium and large iron and manganese stains; neutral (pH 7.0); clear wavy boundary.

B3tg—50 to 60 inches; mixed light gray (10YR 7/1) and white (10YR 8/1) silty clay, gray, (10YR 5/1) grayish brown, (10YR 5/2) and light brownish gray (10YR 6/2) moist; few fine distinct mottles that are brown (10YR 5/3) and yellowish brown (10YR 5/6) when moist; massive; very hard, very firm, very sticky and very plastic; few very fine and fine tubular pores; few thin clay bridges; common fine and medium iron and manganese stains; neutral (pH 7.0); clear wavy boundary.

Cg—60 to 64 inches; mixed light gray (10YR 7/1) and white (10YR 8/1) silty clay, gray, (10YR 5/1) grayish brown, (10YR 5/2) and light brownish gray (10YR 6/2) moist; many fine and medium distinct mottles that are yellowish brown (10YR 5/6) when moist; massive; very hard, very firm, sticky and very plastic; few very fine tubular pores; common fine iron and manganese stains; neutral (pH 7.0).

The solum is 30 to 60 inches thick. A high water table is at a depth of 0 to 1.5 feet from December to June.

A1 horizon: Value is 4 or 5 when dry. Reaction is slightly acid or neutral. The A1 horizon is 7 to 14 inches thick.

B2tg horizon: Hue is 10YR to 5Y. Mottles have hue of 10YR or 7.5YR and chroma of 3 to 6 when moist. Reaction is slightly acid to mildly alkaline.

Cg horizon: Hue is 10YR to 5G. Texture is silty clay loam or silty clay. In some pedons this horizon is gravelly or very gravelly. Mottles have hue of 10YR or 7.5YR, value of 4 to 6 when moist, and chroma of 3 to 6 when moist. Rock fragment content is 0 to 40 percent. Reaction is slightly acid to mildly alkaline.

formation of the soils

Soil is a natural body on the surface of the earth in which plants grow. It is a mixture of rocks, minerals, organic matter, water, and air, all of which occur in varying proportions (*10*). The rocks and minerals are fragmented and are partly or entirely weathered. Soils have more or less distinctive layers, or horizons, that are the product of environmental forces acting upon material deposited or accumulated by geologic processes.

The characteristics of soils are determined by the interaction of parent material, climate, relief or topography, living organisms, and the length of time these forces have acted on the soil material.

parent material

The soils in this survey area formed in residual, glacial, lacustrine, alluvial, and eolian material derived from rock of the Precambrian metasedimentary Belt Series, from Cambrian and post-Cambrian sedimentary and metamorphic rock; and from metamorphosed, coarse-grained or medium-grained igneous rock of the Kaniksu batholith (*5*). These are highly fractured rocks, and most of the soils that formed in material derived from them have a high percentage of coarse fragments. The Vay, Ardtoo, Prouty, Hun, and Lenz soils are typical of these soils. These soils also contain varying amounts of loess and volcanic ash deposited during the Pleistocene and Holocene.

At different times during the Pleistocene, glaciers entered Idaho from Canada and advanced as far south as the Coeur d' Alene area. Many soils in the survey area are underlain by sand, gravel, cobbles, and stones deposited directly or indirectly by the action of glacial ice and melt water. This material is covered by a surficial deposit of volcanic ash and loess. The Pend Oreille, Treble, Dufort, and Priestlake soils formed in glacial till and contain many coarse fragments. During the late Pleistocene, the Bonner, Kootenai, and Kaniksu soils formed in glacial outwash deposited by catastrophic floods from glacial Lake Missoula. These soils also contain a high percentage of coarse fragments.

The volcanic ash in the area originated from many active volcanoes in western Washington and western Oregon, such as Mt. St. Helens, Mt. Rainier, and Glacier Peak. The greatest contribution of ash in this area, however, came about 6,700 years ago from the eruption of Mt. Mazama, the cone of which is now Crater Lake, in southwestern Oregon. The Mazama ashfall was the only one of sufficient extent and thickness to have significantly affected the soils in the area. It fell over the entire area but was eventually eroded from those places that did not have a full cover of trees. Soils such as those of the Pend Oreille, Bonner, Vay, and Prouty series retained the volcanic ash and are strongly influenced by this material.

Glaciolacustrine deposits of clay, silt, and very fine sand occur in the Selle Lowland, extending from Sandpoint north to Boundary County, and also in the valleys of the Pend Oreille, Clark Fork, and Priest Rivers. Mission and Cabinet soils formed in these glacial lake deposits. They have a silt loam surface layer, a silty clay loam or silty clay subsoil, and a varved substratum.

Alluvium in the survey area generally is of local origin. It is derived from material carried in by streams from adjacent uplands. Because of the wide variety of sedimentary, metamorphic, and igneous rocks on the uplands, the alluvium contains a wide variety of material. Capehorn and Colburn soils formed in coarse textured alluvium, and Hoodoo and Rathdrum soils formed in silty alluvium that is high in content of volcanic ash. Pywell soils are peat and muck deposited in former ponds and lakes on the flood plains.

climate

Climate functions directly in the accumulation of parent material and in the differentiation of soil horizons. Temperature and precipitation strongly influence the rate of weathering of rock, the decomposition of minerals, the accumulation and decomposition of organic matter, the growth of plants, and the processes of leaching, eluviation, and illuviation. The climate in the survey area is generally subhumid. It is characterized by warm, dry summers and cold, wet winters. Areas in the mountains have cooler summers and colder winters than areas in the valleys.

Differences in annual precipitation and temperature generally are associated with changes in elevation. The greatest amount of precipitation is received in the higher mountains in the northwestern part of the survey area. In places the average annual precipitation is 50 inches or more. Average annual precipitation at Sandpoint is about 33 inches, but in the drier southern part of the survey area it is 25 inches. The southern part of the area, where the average annual temperature is about 46 degrees F, is the warmest. The coldest part of the area is in the

higher mountains in the northwestern part, where the average annual temperature is 38 to 42 degrees.

Soils in the colder, wetter parts of the area support native vegetation dominated by conifers. The Pend Oreille, Vay, Hun, and Priestlake soils formed under this type of climate. They have a light-colored surface layer, are low in content of organic matter, and are leached of bases. The soils that formed under a warmer and drier climate have a more open tree canopy and have more grass in the understory. These soils, such as those of the Kootenai, Lenz, and Melder series, have a dark-colored surface layer and are higher in content of humus and exchangeable bases. The soils that formed under grass are higher in content of organic matter than the soils that formed under trees because the annual dieback of grass roots is incorporated into the soils. In areas of soils that formed under trees, on the other hand, the tree litter falls on top of the soils and is not incorporated into them.

relief

The relief in the area was determined mainly by the geologic history. Relief influences the formation of soils in the survey area by its effect on drainage, erosion, air drainage, and variation in exposure to the sun and wind. The area has eight predominant geomorphic units: the Selkirk and Cabinet Mountains, the Selle Lowland (Purcell Trench), and the valleys of the Cocolalla, Hoodoo, Blanchard, Clark Fork, and Priest Rivers.

The mountains are deeply dissected by drainageways. This dissection has formed long, winding ridges and relatively steep side slopes. Some of the ridgetops are broad and have slopes ranging from 5 to 25 percent, and some are narrower and have slopes of more than 25 percent. Because of the steep and very steep slopes, most of the mountainous soils are well drained. Geological erosion is active, and accelerated erosion has followed logging, fires, or other disturbances. Consequently, many of the soils are only moderately deep. Examples of moderately deep, steep and very steep soils are those of the Brickel, Prouty, Klootch, Lenz, and Moscow series.

Relief causes variations in rainfall or effective moisture received. Soils at the higher elevations on north-facing slopes, such as the Vay soils, receive less direct sunlight, have colder soil temperatures, and retain moisture longer. Soils on south-facing slopes, such as the Ardtoo soils, receive more sunlight, have warmer soil temperatures, and dry out faster. These differences determine the kind of vegetation that grows on the soils and, consequently, their organic matter content. Generally, there is more leaching of exchangeable bases from the soils that have more moisture.

The soils in the valleys of the survey area are nearly level to undulating. The soils on the higher terraces are better drained than the soils on the lower terraces and flood plains. Because of the level topography on the flood plains, drainage is poor and drainage outlets are not available. This results in a high or fluctuating water table in the soils. The Hoodoo, Pywell, Capehorn, and Wrencoe soils formed along flood plains. These soils have underlying horizons that are gleyed and mottled because of poor drainage. The Kootenai and Bonner soils, which formed on terraces above the flood plains, are well drained and do not have mottles or a seasonal high water table.

living organisms

Living organisms consisting of plant and animal life have a significant function in the process of soil formation. The kind and amount of vegetation that grows on the soil over a long period of time has a strong influence on the kind, amount, and location of the organic matter in the soil.

Some of the soils in the southern part of the survey area formed under an open tree canopy with grass in the understory vegetation. The abundance of fibrous roots adds much humus to the soils, and the organic matter content can be as high as 5 percent throughout the A horizon. Micro-organisms are very active in these soils. They have influenced the dark color, the structure, and the physical condition of the Kootenai, Kruse, Lenz, and Melder soils.

The poorly drained soils of the flood plains and drainageways, such as the Hoodoo and Wrencoe soils, formed under water-tolerant grasses, sedges, and forbs. These soils generally are high in content of organic matter because of the abundance of plants growing on them. They provide good habitat for micro-organisms, which leads to decomposition of the organic matter and its incorporation into the soil. The dark color of the surface layer of these soils indicates that this soil forming process is actively at work.

The living matter in the soils on the higher mountains generally is not decomposing as rapidly as that at lower elevations. This is mainly because of the colder temperatures. These soils formed under a dense canopy of coniferous trees. Soils such as those of the Hun, Pend Oreille, Priestlake, and Vay series have a thick layer of organic litter on top of a light-colored mineral surface layer.

time

Time is required for soil formation, which proceeds in stages, none of which is distinct. It is not possible to be sure when one stage in soil formation ends and another begins. Studying soil formation in stages, however, is simply a way of looking at the continuous process one part at a time. In this survey area, these stages are expressed by horizon differentiation within each soil.

In general, soils on the flood plains are young. Soils such as those of the Hoodoo and Capehorn series have

developed in unconsolidated sediment that was recently laid down. These soils have been influenced enough by soil forming processes to have developed an A horizon and to exhibit leaching of bases.

Soils such as those of the Cabinet and Mission series are on glacial lacustrine terraces and are the oldest and most strongly developed soils in the area. They have had time for the translocation of silicate clay to have taken place, which is indicated by the change in texture from the A horizon to the B2t horizon.

Soils on the mountains and foothills differ somewhat in degree of development. Young soils, such as those of the Brickel and Lenz series, have steep and very steep slopes. These soils have lost soil material by geological erosion nearly as fast as it has formed. Therefore, they are shallow to moderately deep over bedrock and have a thin A horizon. Hun and Vay soils are also relatively young, but they are less susceptible to erosion. They are deep soils in which enough time has elapsed for chemical alteration of the primary minerals in the subsoil to have taken place. Soils such as those of the Kruse and Melder series are intermediate in age. They have been developing long enough for translocation of silicate clay to have taken place, which is indicated by the color, texture, structure, and consistence of the B2t horizon.

Soils of the glacial outwash terraces throughout the southern part of the area are all of about the same age regardless of the elevation of the geomorphic surface on which they occur. The catastrophic floods of glacial Lake Missoula created a sequence of distinct geomorphic surfaces over a relatively short period of time (*4*). The Bonner, Kootenai, and Rathdrum soils occur together on these surfaces, which are glacial outwash terraces.

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glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	More than 12

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15.2 to 38.1 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.
Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or arresting grazing for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and

resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion. *Erosion* (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial melt water.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial melt water. Many deposits are interbedded or laminated.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material.

Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by glacial melt water.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.20 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

	Percent
Nearly level	0 to 2
Gently sloping	2 to 5
Moderately sloping	5 to 10
Strongly sloping	10 to 15
Moderately steep	15 to 30
Steep	30 to 50
Very steep	50 and higher

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-78 at Sandpoint, Idaho]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	32.0	20.9	26.5	48	-13	18	4.80	2.74	6.61	11	30.4
February---	38.5	24.4	31.5	52	-6	16	3.17	1.76	4.40	8	14.8
March------	44.7	26.9	35.8	61	4	43	2.55	1.39	3.57	8	8.4
April------	55.8	33.4	44.6	75	20	154	2.08	1.06	2.96	6	.9
May--------	65.8	39.9	52.9	83	26	400	2.27	1.26	3.15	7	.0
June-------	72.9	46.2	59.6	90	33	588	2.19	1.20	3.04	7	.0
July-------	81.2	48.5	64.9	94	36	772	.95	.23	1.53	3	.0
August-----	79.9	47.3	63.6	96	35	732	1.56	.33	2.53	4	.0
September--	69.7	41.4	55.6	87	27	468	1.68	.54	2.61	5	.0
October----	56.0	34.2	45.1	74	19	164	2.68	.89	4.16	7	1.1
November---	41.0	28.2	34.6	57	7	30	4.36	2.07	6.32	10	8.8
December---	33.8	23.7	28.8	49	-7	14	4.84	3.12	6.39	11	23.7
Yearly:											
Average--	55.9	34.6	45.3	---	---	---	---	---	---	---	---
Extreme--	---	---	---	96	-16	---	---	---	---	---	---
Total----	---	---	---	---	---	3,399	33.13	28.96	37.12	87	88.1

[1] A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-78 at Sandpoint, Idaho]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 27	May 21	June 2
2 years in 10 later than--	April 21	May 15	May 28
5 years in 10 later than--	April 9	May 2	May 18
First freezing temperature in fall:			
1 year in 10 earlier than--	September 26	September 18	September 1
2 years in 10 earlier than--	October 6	September 24	September 6
5 years in 10 earlier than--	October 24	October 7	September 16

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-78 at Sandpoint, Idaho]

Probability	Daily minimum temperature		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	159	132	99
8 years in 10	172	140	106
5 years in 10	197	157	120
2 years in 10	221	173	134
1 year in 10	234	182	141

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Bonner County	Boundary County	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Pct
1	Ardtoo gravelly sandy loam, 35 to 65 percent slopes	9,235	315	9,550	1.4
2	Bonner gravelly silt loam, 0 to 4 percent slopes	29,290	0	29,290	4.4
3	Bonner gravelly silt loam, 30 to 65 percent slopes	3,255	0	3,255	0.5
4	Bonner silt loam, cool, 0 to 4 percent slopes	30,460	85	30,545	4.6
5	Brickel-Rubble land association, 5 to 45 percent slopes	4,170	1,410	5,580	0.8
6	Cabinet silt loam, 2 to 12 percent slopes	2,805	0	2,805	0.4
7	Cabinet silt loam, 12 to 30 percent slopes	1,765	0	1,765	0.3
8	Capehorn silt loam, 0 to 2 percent slopes	5,460	75	5,535	0.8
9	Colburn very fine sandy loam, 0 to 4 percent slopes	8,380	0	8,380	1.2
10	Dufort silt loam, 5 to 45 percent slopes	9,615	0	9,615	1.4
11	Dufort-Rock outcrop complex, 5 to 45 percent slopes	11,635	0	11,635	1.7
12	Elmira loamy sand, 0 to 8 percent slopes	1,005	0	1,005	0.1
13	Elmira Variant loamy coarse sand, 0 to 2 percent slopes	815	0	815	0.1
14	Haploxeralfs and Xerochrepts, 30 to 55 percent slopes	4,305	0	4,305	0.6
15	Hoodoo silt loam, 0 to 1 percent slopes	7,145	0	7,145	1.1
16	Hun gravelly silt loam, 35 to 65 percent slopes	16,010	8,475	24,485	3.7
17	Jeru very stony loam, 35 to 65 percent slopes	6,460	7,125	13,585	2.0
18	Jeru very stony sandy loam, warm, 5 to 35 percent slopes	2,925	2,115	5,040	0.8
19	Jeru very stony sandy loam, warm, 35 to 75 percent slopes	6,620	8,210	14,830	2.2
20	Kaniksu sandy loam, 0 to 4 percent slopes	8,545	0	8,545	1.3
21	Klootch gravelly sandy loam, 15 to 35 percent slopes	650	0	650	0.1
22	Klootch gravelly sandy loam, 35 to 65 percent slopes	1,645	0	1,645	0.2
23	Kootenai gravelly silt loam, 0 to 4 percent slopes	11,565	0	11,565	1.7
24	Kootenai gravelly silt loam, 20 to 55 percent slopes	1,425	0	1,425	0.2
25	Kootenai-Bonner gravelly silt loams, 0 to 20 percent slopes	5,150	0	5,150	0.8
26	Kruse silt loam, 30 to 65 percent slopes	2,670	0	2,670	0.4
27	Kruse Variant silt loam, 5 to 20 percent slopes	720	0	720	0.1
28	Lenz-Rock outcrop association, 30 to 65 percent slopes	20,555	0	20,555	3.1
29	Melder loam, 15 to 35 percent slopes	1,365	0	1,365	0.2
30	Melder loam, 35 to 65 percent slopes	7,065	0	7,065	1.1
31	Mission silt loam, 0 to 2 percent slopes	13,955	0	13,955	2.1
32	Mission silt loam, 2 to 12 percent slopes	12,775	0	12,775	1.9
33	Mission silt loam, 12 to 30 percent slopes	2,600	0	2,600	0.4
34	Odenson silt loam, 0 to 2 percent slopes	3,570	0	3,570	0.5
35	Pend Oreille silt loam, 5 to 45 percent slopes	84,320	0	84,320	12.6
36	Pend Oreille-Hoodoo silt loams, 0 to 30 percent slopes	8,290	0	8,290	1.2
37	Pend Oreille-Rock outcrop complex, 5 to 45 percent slopes	28,170	0	28,170	4.2
38	Priestlake gravelly sandy loam, 15 to 35 percent slopes	7,075	1,295	8,370	1.2
39	Priestlake gravelly sandy loam, 35 to 65 percent slopes	24,830	1,400	26,230	3.9
40	Prouty gravelly loam, 35 to 65 percent slopes	15,850	20,270	36,120	5.4
41	Pywell muck, 0 to 1 percent slopes	1,195	0	1,195	0.2
42	Pywell-Hoodoo complex, 0 to 1 percent slopes	7,985	0	7,985	1.2
43	Rathdrum silt loam, 0 to 2 percent slopes	970	0	970	0.1
44	Rathdrum silt loam, cool, 0 to 8 percent slopes	425	0	425	0.1
45	Rathdrum-Bonner silt loams, 0 to 8 percent slopes	3,775	0	3,775	0.6
46	Rock outcrop-Rubble land complex	16,405	22,300	38,705	5.8
47	Sagle silt loam, 5 to 30 percent slopes	4,855	0	4,855	0.7
48	Selle fine sandy loam, 0 to 8 percent slopes	4,935	0	4,935	0.7
49	Selle-Elmira complex, 0 to 20 percent slopes	3,395	0	3,395	0.5
50	Selle-Mission complex, 0 to 12 percent slopes	1,860	0	1,860	0.3
51	Treble gravelly sandy loam, 5 to 20 percent slopes	1,890	0	1,890	0.3
52	Treble gravelly sandy loam, 20 to 55 percent slopes	2,630	0	2,630	0.4
53	Treble gravelly sandy loam, high precipitation, 15 to 35 percent slopes	1,035	0	1,035	0.2
54	Treble gravelly sandy loam, high precipitation, 35 to 65 percent slopes	5,120	115	5,235	0.8
55	Treble-Rock outcrop association, 20 to 65 percent slopes	28,735	0	28,735	4.3
56	Treble, high precipitation-rock outcrop complex, 15 to 35 percent slopes	1,845	0	1,845	0.3
57	Treble, high precipitation-rock outcrop complex, 35 to 65 percent slopes	8,765	535	9,300	1.4
58	Vassar silt loam, 30 to 65 percent slopes	2,495	0	2,495	0.4
59	Vassar-Moscow association, 35 to 65 percent slopes	1,475	0	1,475	0.2
60	Vay gravelly silt loam, 35 to 65 percent slopes	10,420	890	11,310	1.7
61	Vay silt loam, cool, 30 to 65 percent slopes	12,240	0	12,240	1.8
62	Vay-Ardtoo association, 20 to 35 percent slopes	2,965	0	2,965	0.4
63	Vay-Ardtoo association, 35 to 65 percent slopes	42,970	0	42,970	6.4

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Bonner County	Boundary County	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Pct
64	Wrencoe silty clay, 0 to 2 percent slopes	2,620	0	2,620	0.4
	Water	770	85	855	0.1
	Total	595,920	74,700	670,620	100.0

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields in the N columns are for nonirrigated soils; those in the I columns are for irrigated soils. Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil. Only the soils suited to crops and pasture are listed]

Soil name and map symbol	Oats		Barley		Spring wheat		Grass-legume hay		Pasture	
	N	I	N	I	N	I	N	I	N	I
	Bu	Bu	Bu	Bu	Bu	Bu	Ton	Ton	AUM*	AUM*
2---------- Bonner	30	85	20	60	20	45	1.5	3.0	4.0	8.0
4---------- Bonner	---	---	---	---	---	---	1.0	---	2.5	---
6---------- Cabinet	60	---	30	---	20	---	1.5	---	4.0	---
8---------- Capehorn	---	---	---	---	---	---	1.5	---	3.0	---
9---------- Colburn	75	---	60	---	40	---	2.0	---	5.0	---
10---------- Dufort	---	---	---	---	---	---	2.0	---	5.0	---
12---------- Elmira	20	40	20	40	20	40	0.5	2.5	1.5	6.0
15---------- Hoodoo	75	---	50	---	30	---	4.0	---	10.0	---
20---------- Kaniksu	20	85	20	85	25	45	1.5	3.0	3.5	8.0
23---------- Kootenai	20	85	20	85	25	45	1.5	3.0	3.5	8.0
25---------- Kootenai-Bonner	25	85	20	75	25	45	1.5	3.0	3.5	8.0
31---------- Mission	75	---	60	---	30	---	2.5	---	6.0	---
32---------- Mission	75	---	60	---	30	---	2.5	---	6.0	---
33---------- Mission	---	---	---	---	---	---	2.0	---	5.0	---
34---------- Odenson	---	---	---	---	---	---	4.0	---	10.0	---
35---------- Pend Oreille	---	---	---	---	---	---	2.0	3.5	5.0	9.0
36---------- Pend Oreille-Hoodoo	---	---	---	---	---	---	2.5	---	6.5	---
41---------- Pywell	85	---	65	---	40	---	5.0	---	12.0	---
42---------- Pywell-Hoodoo	80	---	60	---	35	---	4.5	---	11.0	---
43---------- Rathdrum	40	85	30	70	30	50	1.5	4.0	4.0	10.0

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Oats		Barley		Spring wheat		Grass-legume hay		Pasture	
	N	I	N	I	N	I	N	I	N	I
	Bu	Bu	Bu	Bu	Bu	Bu	Ton	Ton	AUM*	AUM*
45---------- Rathdrum-Bonner	35	85	25	65	25	50	1.5	3.5	4.0	9.0
47---------- Sagle	---	---	---	---	---	---	2.0	---	5.0	---
48---------- Selle	45	70	30	60	20	40	2.0	3.5	5.0	9.0
49---------- Selle-Elmira	35	60	25	55	20	40	1.5	3.0	4.0	8.0
50---------- Selle-Mission	55	---	40	---	25	---	2.5	---	5.5	---
64---------- Wrencoe	---	---	---	---	---	---	3.5	---	9.0	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
1---------- Ardtoo	1f	Severe	Severe	Moderate	Moderate	Grand fir---------- Douglas-fir--------- Ponderosa pine------ Western larch-------	70 110 105 ---	Douglas-fir, grand fir.
2---------- Bonner	2o	Slight	Slight	Slight	Moderate	Grand fir---------- Douglas-fir--------- Ponderosa pine------ Western larch------- Lodgepole pine------	60 110 105 --- ---	Douglas-fir, grand fir, ponderosa pine.
3---------- Bonner	2r	Severe	Severe	Slight	Moderate	Grand fir---------- Douglas-fir--------- Ponderosa pine------ Western larch------- Lodgepole pine------	60 110 105 --- ---	Douglas-fir, grand fir, ponderosa pine.
4---------- Bonner	1o	Slight	Slight	Slight	Severe	Western hemlock----- Western redcedar---- Western white pine-- Grand fir---------- Douglas-fir--------- Western larch-------	--- --- 85 90 125 ---	Western white pine, grand fir, Douglas-fir.
6---------- Cabinet	1w	Slight	Moderate	Slight	Severe	Western redcedar---- Western white pine-- Grand fir---------- Douglas-fir--------- Western larch------- Ponderosa pine------ Western hemlock----- Lodgepole pine------	--- 90 90 115 --- --- --- ---	Western white pine, grand fir, Douglas-fir.
7---------- Cabinet	1w	Severe	Moderate	Slight	Severe	Western redcedar---- Western white pine-- Grand fir---------- Douglas-fir--------- Western larch------- Ponderosa pine------ Western hemlock-----	--- 80 90 120 --- --- ---	Western white pine, grand fir, Douglas-fir.
8---------- Capehorn	1w	Slight	Moderate	Slight	Severe	Western redcedar---- Western hemlock----- Western white pine-- Grand fir---------- Western larch-------	--- --- 85 --- ---	Grand fir, western white pine.
9---------- Colburn	1w	Slight	Moderate	Slight	Severe	Western redcedar---- Western white pine-- Grand fir---------- Douglas-fir--------- Ponderosa pine------ Western larch------- Lodgepole pine------	--- 85 85 --- --- --- ---	Western white pine, grand fir, Douglas-fir.
10---------- Dufort	1r	Severe	Moderate	Slight	Severe	Grand fir---------- Douglas-fir--------- Ponderosa pine------ Western larch------- Western white pine-- Lodgepole pine------	75 115 --- --- --- ---	Douglas-fir, grand fir, ponderosa pine.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
11*: Dufort	2r	Severe	Moderate	Slight	Severe	Grand fir Douglas-fir Ponderosa pine Western larch Western white pine Lodgepole pine	75 115 --- --- --- ---	Douglas-fir, grand fir, ponderosa pine.
11*: Rock outcrop.								
12 Elmira	1s	Slight	Moderate	Moderate	Moderate	Douglas-fir Ponderosa pine Western larch Lodgepole pine	115 115 --- 	Ponderosa pine, Douglas-fir.
13 Elmira Variant	2w	Slight	Moderate	Moderate	Moderate	Western hemlock Western redcedar Western white pine Grand fir Western larch Lodgepole pine	--- --- 65 60 --- ---	Western white pine, grand fir.
16 Hun	2f	Severe	Severe	Moderate	Severe	Western hemlock Western redcedar Western white pine Grand fir Douglas-fir Western larch	--- --- 60 --- 105 ---	Western white pine, Douglas-fir, grand fir.
17 Jeru	4x	Severe	Severe	Moderate	Severe	Subalpine fir Engelmann spruce Western white pine	65 70 ---	Subalpine fir, Englemann spruce.
18 Jeru	2x	Moderate	Moderate	Moderate	Severe	Western hemlock Western redcedar Western white pine Grand fir Douglas-fir Western larch	--- --- 65 --- 105 ---	Douglas-fir, western white pine, grand fir.
19 Jeru	2x	Severe	Severe	Moderate	Severe	Western hemlock Western redcedar Western white pine Grand fir Douglas-fir Western larch	--- --- 65 --- 105 ---	Douglas-fir, western white pine, grand fir.
20 Kaniksu	2s	Slight	Slight	Moderate	Moderate	Douglas-fir Ponderosa pine Lodgepole pine	105 120 ---	Ponderosa pine, Douglas-fir.
21 Klootch	2d	Moderate	Moderate	Moderate	Severe	Western redcedar Douglas-fir Grand fir Western larch Western hemlock Western white pine	--- 120 60 --- --- ---	Douglas-fir, grand fir, western white pine.
22 Klootch	2d	Severe	Severe	Moderate	Severe	Western redcedar Douglas-fir Grand fir Western larch Western hemlock Western white pine	--- 120 60 --- --- ---	Douglas-fir, grand fir, western white pine.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
23---------- Kootenai	3f	Slight	Slight	Moderate	Moderate	Douglas-fir--------- Ponderosa pine------ Lodgepole pine------	--- 95 ---	Ponderosa pine, Douglas-fir.
24---------- Kootenai	3f	Severe	Severe	Moderate	Moderate	Douglas-fir--------- Ponderosa pine------ Lodgepole pine------	--- 95 ---	Ponderosa pine, Douglas-fir.
25*: Kootenai----------	3f	Moderate	Slight	Moderate	Moderate	Douglas-fir--------- Ponderosa pine------ Lodgepole pine------	--- 95 ---	Ponderosa pine, Douglas-fir.
Bonner----------	2o	Slight	Slight	Slight	Moderate	Grand fir---------- Douglas-fir--------- Ponderosa pine------ Western larch------- Lodgepole pine------	60 110 105 --- ---	Douglas-fir, grand fir, ponderosa pine.
26---------- Kruse	1r	Severe	Severe	Slight	Severe	Grand fir---------- Douglas-fir--------- Ponderosa pine------ Western white pine-- Western larch------- Lodgepole pine------	85 125 120 --- --- ---	Douglas-fir, ponderosa pine, grand fir.
27---------- Kruse Variant	1o	Moderate	Moderate	Slight	Severe	Western hemlock----- Western redcedar---- Western white pine-- Grand fir----------	--- --- 70 ---	Western white pine, grand fir.
28*: Lenz----------	3x	Severe	Severe	Severe	Moderate	Ponderosa pine------ Douglas-fir--------- Western larch------- Lodgepole pine------	95 90 --- ---	Ponderosa pine, Douglas-fir.
Rock outcrop.								
29---------- Melder	1r	Moderate	Moderate	Moderate	Severe	Douglas-fir--------- Ponderosa pine------	115 115	Douglas-fir, ponderosa pine.
30---------- Melder	1r	Severe	Severe	Moderate	Severe	Douglas-fir--------- Ponderosa pine------	115 115	Douglas-fir, ponderosa pine.
31, 32---------- Mission	1d	Slight	Moderate	Slight	Severe	Western redcedar---- Western white pine-- Grand fir---------- Douglas-fir--------- Western larch------- Ponderosa pine------	--- 85 85 120 --- ---	Western white pine, grand fir, Douglas-fir.
33---------- Mission	1d	Severe	Severe	Slight	Severe	Western redcedar---- Western white pine-- Grand fir---------- Douglas-fir--------- Western larch------- Ponderosa pine------	--- 85 85 120 --- ---	Western white pine, grand fir, Douglas-fir.
35---------- Pend Oreille	1r	Severe	Moderate	Slight	Severe	Western redcedar---- Western white pine-- Grand fir---------- Douglas-fir--------- Western larch------- Ponderosa pine------ Lodgepole pine------	--- 70 75 115 --- --- ---	Western white pine, grand fir, Douglas-fir.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
36*:								
Pend Oreille	1o	Moderate	Slight	Slight	Severe	Western redcedar	---	Western white pine, grand fir, Douglas-fir.
						Western white pine	70	
						Grand fir	75	
						Douglas-fir	115	
						Western larch	---	
						Ponderosa pine	---	
						Lodgepole pine	---	
Hoodoo.								
37*:								
Pend Oreille	1x	Severe	Moderate	Slight	Severe	Western redcdear	---	Western white pine, grand fir, Douglas-fir.
						Western white pine	70	
						Grand fir	75	
						Douglas-fir	115	
						Western larch	---	
						Ponderosa pine	---	
						Lodgepole pine	---	
Rock outcrop.								
38	1f	Moderate	Moderate	Slight	Moderate	Western hemlock	---	Western white pine, Douglas-fir, grand fir.
Priestlake						Western redcedar	---	
						Western white pine	70	
						Grand fir	60	
						Douglas-fir	---	
						Western larch	---	
39	1f	Severe	Severe	Slight	Moderate	Western hemlock	---	Western white pine, Douglas-fir, grand fir.
Priestlake						Western redcedar	---	
						Western white pine	70	
						Grand fir	60	
						Douglas-fir	---	
						Western larch	---	
40	4f	Severe	Severe	Moderate	Severe	Subalpine fir	60	Subalpine fir.
Prouty						Engelmann spruce	---	
						Western white pine	---	
43	1o	Slight	Slight	Slight	Severe	Western redcedar	---	Western white pine, Douglas-fir, grand fir.
Rathdrum						Western white pine	70	
						Grand fir	65	
						Douglas-fir	115	
						Ponderosa pine	---	
						Western larch	---	
						Lodgepole pine	---	
44	1o	Slight	Slight	Slight	Severe	Western hemlock	---	Western white pine, Douglas-fir, grand fir.
Rathdrum						Western redcedar	---	
						Western white pine	75	
						Grand fir	70	
						Douglas-fir	120	
						Western larch	---	
						Lodgepole pine	---	
45*:								
Rathdrum	1o	Slight	Slight	Slight	Severe	Western redcedar	---	Western white pine, Douglas-fir, grand fir.
						Western white pine	70	
						Grand fir	65	
						Douglas-fir	115	
						Ponderosa pine	---	
						Western larch	---	
						Lodgepole pine	---	
Bonner	2o	Slight	Slight	Slight	Moderate	Grand fir	60	Douglas-fir, grand fir, ponderosa pine.
						Douglas-fir	110	
						Ponderosa pine	105	
						Western larch	---	
						Lodgepole pine	---	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
47---------- Sagle	1w	Severe	Moderate	Slight	Severe	Grand fir----------	70	Douglas-fir, ponderosa pine, grand fir.
						Douglas-fir----------	115	
						Ponderosa pine------	110	
						Western larch-------	---	
						Lodgepole pine------	---	
48---------- Selle	1o	Slight	Slight	Moderate	Severe	Western redcedar----	---	Western white pine, Douglas-fir, grand fir.
						Western white pine--	75	
						Grand fir----------	75	
						Douglas-fir----------	115	
						Ponderosa pine------	105	
						Western larch-------	---	
						Lodgepole pine------	---	
49*:								
Selle----------	1o	Slight	Slight	Moderate	Severe	Western redcedar----	---	Western white pine, Douglas-fir, grand fir.
						Western white pine--	75	
						Grand fir----------	75	
						Douglas-fir----------	115	
						Ponderosa pine------	105	
						Western larch-------	---	
						Lodgepole pine------	---	
Elmira----------	1s	Slight	Moderate	Moderate	Moderate	Douglas-fir----------	115	Ponderosa pine, Douglas-fir.
						Ponderosa pine------	115	
						Western larch-------	---	
						Lodgepole pine------	---	
50*:								
Selle----------	1o	Slight	Slight	Moderate	Severe	Western redcedar----	---	Western white pine, Douglas-fir, grand fir.
						Western white pine--	75	
						Grand fir----------	75	
						Douglas-fir----------	115	
						Ponderosa pine------	105	
						Western larch-------	---	
						Lodgepole pine------	---	
Mission----------	1d	Slight	Moderate	Slight	Severe	Western redcedar----	---	Western white pine, grand fir, Douglas-fir.
						Western white pine--	85	
						Grand fir----------	85	
						Douglas-fir----------	120	
						Western larch-------	---	
						Ponderosa pine------	---	
51---------- Treble	2f	Slight	Slight	Severe	Moderate	Douglas-fir----------	105	Douglas-fir, ponderosa pine.
						Ponderosa pine------	105	
						Western larch-------	---	
						Lodgepole pine------	---	
52---------- Treble	2f	Severe	Severe	Severe	Moderate	Douglas-fir----------	105	Douglas-fir, ponderosa pine.
						Ponderosa pine------	105	
						Western larch-------	---	
						Lodgepole pine------	---	
53---------- Treble	1f	Moderate	Moderate	Moderate	Moderate	Grand fir----------	70	Douglas-fir, western white pine, grand fir.
						Western white pine--	---	
						Douglas-fir----------	105	
						Ponderosa pine------	105	
						Western larch-------	---	
54---------- Treble	1f	Severe	Severe	Moderate	Moderate	Grand fir----------	70	Douglas-fir, western white pine, grand fir.
						Western white pine--	---	
						Douglas-fir----------	105	
						Ponderosa pine------	105	
						Western larch-------	---	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
55*:								
Treble	2x	Severe	Severe	Severe	Moderate	Douglas-fir	105	Douglas-fir, ponderosa pine.
						Ponderosa pine	105	
						Western larch	---	
						Lodgepole pine	---	
Rock outcrop.								
56*:								
Treble	1x	Moderate	Moderate	Moderate	Moderate	Grand fir	70	Douglas-fir, western white pine, grand fir.
						Western white pine	---	
						Douglas-fir	105	
						Ponderosa pine	105	
						Western larch	---	
Rock outcrop.								
57*:								
Treble	1x	Severe	Severe	Moderate	Moderate	Grand fir	70	Douglas-fir, western white pine, grand fir.
						Western white pine	---	
						Douglas-fir	105	
						Ponderosa pine	105	
						Western larch	---	
Rock outcrop.								
58----- Vassar	1r	Severe	Severe	Slight	Severe	Western redcedar	---	Douglas-fir, western white pine, grand fir.
						Western white pine	---	
						Grand fir	90	
						Douglas-fir	---	
						Ponderosa pine	---	
						Western larch	---	
59*:								
Vassar	1r	Severe	Severe	Slight	Severe	Western redcedar	---	Douglas-fir, western white pine, grand fir.
						Western white pine	---	
						Grand fir	90	
						Douglas-fir	---	
						Ponderosa pine	---	
						Western larch	---	
Moscow	2d	Severe	Severe	Slight	Moderate	Grand fir	---	Douglas-fir, ponderosa pine.
						Ponderosa pine	115	
						Douglas-fir	105	
						Western larch	---	
						Lodgepole pine	---	
60----- Vay	1r	Severe	Severe	Slight	Severe	Western redcedar	---	Grand fir, western white pine, Douglas-fir.
						Grand fir	80	
						Western white pine	75	
						Douglas-fir	120	
						Western larch	---	
						Ponderosa pine	---	
						Western hemlock	---	
61----- Vay	3r	Severe	Severe	Slight	Severe	Subalpine fir	90	Subalpine fir, Engelmann spruce.
						Engelmann spruce	80	
						Western larch	---	
						Western white pine	---	
						Grand fir	---	
						Douglas-fir	---	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
62*:								
Vay	1r	Severe	Moderate	Slight	Severe	Western redcedar	---	Grand fir, western white pine, Douglas-fir.
						Grand fir	80	
						Western white pine	75	
						Douglas-fir	120	
						Western larch	---	
						Ponderosa pine	---	
						Western hemlock	---	
Ardtoo	1f	Moderate	Moderate	Moderate	Moderate	Grand fir	70	Grand fir, Douglas-fir.
						Douglas-fir	110	
						Ponderosa pine	105	
						Western larch	---	
63*:								
Vay	1r	Severe	Severe	Slight	Severe	Western redcedar	---	Grand fir, western white pine, Douglas-fir.
						Grand fir	80	
						Western white pine	75	
						Douglas-fir	120	
						Western larch	---	
						Ponderosa pine	---	
						Western hemlock	---	
Ardtoo	1f	Severe	Severe	Moderate	Moderate	Grand fir	70	Douglas-fir, grand fir.
						Douglas-fir	110	
						Ponderosa pine	105	
						Western larch	---	

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WOODLAND UNDERSTORY VEGETATION

[Only the soils suitable for production of commercial trees are listed]

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
1----------	Favorable	300	Common snowberry----------	10
Ardtoo	Normal	250	Myrtle pachystima----------	10
	Unfavorable	150	Northern twinflower----------	10
			Sedge----------	5
			Queencup beadlily----------	5
			Baldhip rose----------	5
			Piper anemone----------	5
			Columbia brome----------	5
			American trailplant----------	5
			Pacific trillium----------	5
			Starry false-solomons-seal----------	5
2, 3----------	Favorable	250	Common snowberry----------	10
Bonner	Normal	200	Pine reedgrass----------	10
	Unfavorable	150	Sedge----------	10
			Common princes pine----------	5
			Myrtle pachystima----------	5
			Queencup beadlily----------	5
			Baldhip rose----------	5
			Longtube twinflower----------	5
			American trailplant----------	5
			Piper anemone----------	5
			Goldthread----------	5
4----------	Favorable	300	Myrtle pachystima----------	15
Bonner	Normal	200	Longtube twinflower----------	15
	Unfavorable	50	Baldhip rose----------	10
			Common princes pine----------	10
			Queencup beadlily----------	5
			Pine reedgrass----------	5
			Sedge----------	5
6, 7----------	Favorable	500	Brackenfern----------	10
Cabinet	Normal	300	Myrtle pachystima----------	10
	Unfavorable	100	White spirea----------	10
			American trailplant----------	5
			Goldthread----------	5
			Blue wildrye----------	5
			Longtube twinflower----------	5
			Violet----------	5
			Common snowberry----------	5
			Fairybells----------	5
8----------	Favorable	300	Queencup beadlily----------	10
Capehorn	Normal	200	Common ladyfern----------	10
	Unfavorable	50	Rose----------	10
			Columbia brome----------	5
			Violet----------	5
			Western thimbleberry----------	5
			Common princes pine----------	5
			Honeysuckle----------	5
			Big blueberry----------	5
9----------	Favorable	300	Goldthread----------	15
Colburn	Normal	200	Starry false-solomons-seal----------	15
	Unfavorable	100	Pine reedgrass----------	10
			Violet----------	10
			Myrtle pachystima----------	10
			Sedge----------	5
			Common snowberry----------	5
			American trailplant----------	5
			Fairybells----------	5

See footnote at end of table.

TABLE 7.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
10----------	Favorable	250	Common snowberry----------	10
Dufort	Normal	200	Longtube twinflower----------	10
	Unfavorable	150	Pine reedgrass----------	10
			Myrtle pachystima----------	10
			Queencup beadlily----------	5
			Baldhip rose----------	5
			American trailplant----------	5
			Piper anemone----------	5
			Goldthread----------	5
			Sedge----------	5
11*:				
Dufort----------	Favorable	250	Common snowberry----------	10
	Normal	200	Longtube twinflower----------	10
	Unfavorable	150	Pine reedgrass----------	10
			Myrtle pachystima----------	5
			Queencup beadlily----------	5
			Baldhip rose----------	5
			American trailplant----------	5
			Piper anemone----------	5
			Goldthread----------	5
			Sedge----------	5
Rock outcrop.				
12----------	Favorable	1,000	Pine reedgrass----------	25
Elmira	Normal	700	Low Oregon-grape----------	10
	Unfavorable	500	Bluebunch wheatgrass----------	10
			Saskatoon serviceberry----------	10
			Common chokecherry----------	10
			Common snowberry----------	8
			Woods rose----------	5
			Snowbrush ceanothus----------	5
13----------	Favorable	300	American trailplant----------	10
Elmira Variant	Normal	200	Honeysuckle----------	10
	Unfavorable	50	Rose----------	10
			Myrtle pachystima----------	10
			Columbia brome----------	5
			Common beargrass----------	5
			Common princes pine----------	5
			Big blueberry----------	5
			Queencup beadlily----------	5
16----------	Favorable	500	Common beargrass----------	15
Hun	Normal	300	Myrtle pachystima----------	10
	Unfavorable	100	Big blueberry----------	10
			Groundsel----------	5
			Queencup beadlily----------	5
			Sitka alder----------	5
			Longtube twinflower----------	5
			Honeysuckle----------	5
			Rose----------	5
			American trailplant----------	5
17----------	Favorable	700	Common beargrass----------	25
Jeru	Normal	550	Big blueberry----------	10
	Unfavorable	400	Myrtle pachystima----------	10
			Western mountainash----------	5
			Sedge----------	5
			Rustyleaf menziesia----------	5
			Scouler willow----------	5
			Western thimbleberry----------	5
			Utah honeysuckle----------	5
			Elk sedge----------	5

See footnote at end of table.

TABLE 7.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
18, 19----------	Favorable	300	American trailplant----------	10
Jeru	Normal	200	Honeysuckle----------	10
	Unfavorable	50	Rose----------	10
			Myrtle pachystima----------	10
			Columbia brome----------	5
			Common beargrass----------	5
			Common princes pine----------	5
			Queencup beadlily----------	5
20----------	Favorable	1,000	Common snowberry----------	15
Kaniksu	Normal	700	Bluebunch wheatgrass----------	10
	Unfavorable	500	Elk sedge----------	10
			Pine reedgrass----------	10
			Strawberry----------	10
			Heartleaf arnica----------	5
			White spirea----------	5
			Queencup beadlily----------	5
			Rose----------	5
21, 22----------	Favorable	500	Myrtle pachystima----------	15
Klootch	Normal	300	Common beargrass----------	10
	Unfavorable	100	Big blueberry----------	10
			Groundsel----------	5
			Queencup beadlily----------	5
			Sitka alder----------	5
			American trailplant----------	5
			Goldthread----------	5
			Fairybells----------	5
23, 24----------	Favorable	1,000	Common snowberry----------	15
Kootenai	Normal	800	Bluebunch wheatgrass----------	10
	Unfavorable	600	Elk sedge----------	10
			Pine reedgrass----------	10
			White spirea----------	10
			Western fescue----------	5
			Strawberry----------	5
			Rose----------	5
25*:				
Kootenai----------	Favorable	1,000	Common snowberry----------	15
	Normal	800	Bluebunch wheatgrass----------	10
	Unfavorable	600	Elk sedge----------	10
			Pine reedgrass----------	10
			White spirea----------	10
			Western fescue----------	5
			Strawberry----------	5
			Rose----------	5
Bonner----------	Favorable	250	Common snowberry----------	10
	Normal	200	Pine reedgrass----------	10
	Unfavorable	150	Sedge----------	10
			Common princes pine----------	5
			Myrtle pachystima----------	5
			Queencup beadlily----------	5
			Baldhip rose----------	5
			Longtube twinflower----------	5
			American trailplant----------	5
			Piper anemone----------	5
			Goldthread----------	5

See footnote at end of table.

TABLE 7.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
26---------- Kruse	Favorable	300	Myrtle pachystima	10
	Normal	250	Longtube twinflower	10
	Unfavorable	150	Pine reedgrass	10
			Common snowberry	10
			Goldthread	5
			Columbia brome	5
			American trailplant	5
			Baldhip rose	5
			Queencup beadlily	5
			Starry false-solomons-seal	5
			Sweetscented bedstraw	5
27---------- Kruse Variant	Favorable	500	Myrtle pachystima	15
	Normal	300	Common beargrass	10
	Unfavorable	100	Queencup beadlily	10
			Big blueberry	10
			Groundsel	5
			Sitka alder	5
			Longtube twinflower	5
			Fairybells	5
28*:				
Lenz----------	Favorable	1,000	Common snowberry	15
	Normal	850	Idaho fescue	5
	Unfavorable	500	Bluebunch wheatgrass	5
			Elk sedge	5
			Pine reedgrass	5
			Western fescue	5
			Strawberry	5
			Heartleaf arnica	5
			Mallow ninebark	5
			White spirea	5
			Rose	5
			Blue wildrye	5
Rock outcrop.				
29, 30---------- Melder	Favorable	800	Common snowberry	20
	Normal	600	Blue wildrye	10
	Unfavorable	400	Pine reedgrass	10
			Rose	10
			Bluebunch wheatgrass	5
			Sticky geranium	5
			Saskatoon serviceberry	5
31, 32, 33--------- Mission	Favorable	250	Goldthread	15
	Normal	200	Violet	10
	Unfavorable	150	Myrtle pachystima	10
			Piper anemone	5
			Fairyslipper orchid	5
			Rose	5
			Queencup beadlily	5
			American trailplant	5
			Fairybells	5
35---------- Pend Oreille	Favorable	300	Myrtle pachystima	10
	Normal	200	Big blueberry	5
	Unfavorable	50	Longtube twinflower	5
			Queencup beadlily	5
			Oakfern	5
			Starry false-solomons-seal	5
			American trailplant	5
			Goldthread	5
			Fairybells	5
			Common princes pine	5

See footnote at end of table.

TABLE 7.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
36*:				
Pend Oreille	Favorable	300	Myrtle pachystima	10
	Normal	200	Big blueberry	5
	Unfavorable	50	Longtube twinflower	5
			Queencup beadlily	5
			Oakfern	5
			Starry false-solomons-seal	5
			American trailplant	5
			Goldthread	5
			Fairybells	5
			Common princes pine	5
Hoodoo.				
37*:				
Pend Oreille	Favorable	300	Myrtle pachystima	10
	Normal	200	Big blueberry	5
	Unfavorable	50	Longtube twinflower	5
			Queencup beadlily	5
			Oakfern	5
			Starry false-solomons-seal	5
			American trailplant	5
			Goldthread	5
			Fairybells	5
			Common princes pine	5
Rock outcrop.				
38, 39	Favorable	300	American trailplant	15
Priestlake	Normal	200	Honeysuckle	10
	Unfavorable	50	Rose	10
			Myrtle pachystima	10
			Columbia brome	5
			Common beargrass	5
			Common princes pine	5
			Big blueberry	5
			Queencup beadlily	5
40	Favorable	700	Common beargrass	40
Prouty	Normal	550	Big blueberry	15
	Unfavorable	400	Rustyleaf menziesia	10
			Honeysuckle	5
43	Favorable	350	Myrtle pachystima	10
Rathdrum	Normal	275	Western thimbleberry	10
	Unfavorable	200	Big blueberry	5
			Sedge	5
			Common ladyfern	5
			Queencup beadlily	5
			Brackenfern	5
			Longtube twinflower	5
			Pine reedgrass	5
			Baldhip rose	5
			Fairybells	5
44	Favorable	300	Longtube twinflower	15
Rathdrum	Normal	200	Myrtle pachystima	10
	Unfavorable	50	Piper anemone	10
			Violet	10
			Common princes pine	10
			Big blueberry	5
			Queencup beadlily	5
			Columbia brome	5

See footnote at end of table.

TABLE 7.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
45*:				
Rathdrum	Favorable	350	Myrtle pachystima	10
	Normal	275	Western thimbleberry	10
	Unfavorable	200	Big blueberry	5
			Sedge	5
			Common ladyfern	5
			Queencup beadlily	5
			Brackenfern	5
			Longtube twinflower	5
			Pine reedgrass	5
			Baldhip rose	5
			Fairybells	5
Bonner	Favorable	250	Common snowberry	10
	Normal	200	Pine reedgrass	10
	Unfavorable	150	Sedge	10
			Common princes pine	5
			Myrtle pachystima	5
			Queencup beadlily	5
			Baldhip rose	5
			Longtube twinflower	5
			American trailplant	5
			Piper anemone	5
			Goldthread	5
47	Favorable	300	Goldthread	15
Sagle	Normal	200	Pine reedgrass	10
	Unfavorable	100	Sedge	10
			Violet	10
			Myrtle pachystima	10
			Common snowberry	5
			Common princes pine	5
			Longtube twinflower	5
			Starry false-solomons-seal	5
48	Favorable	350	Myrtle pachystima	10
Selle	Normal	250	Sedge	10
	Unfavorable	50	American trailplant	5
			Piper anemone	5
			Goldthread	5
			Columbia brome	5
			Fairybells	5
			Violet	5
			Queencup beadlily	5
49*:				
Selle	Favorable	350	Myrtle pachystima	10
	Normal	250	Sedge	10
	Unfavorable	50	American trailplant	5
			Piper anemone	5
			Goldthread	5
			Columbia brome	5
			Fairybells	5
			Violet	5
			Queencup beadlily	5
Elmira	Favorable	1,000	Pine reedgrass	25
	Normal	700	Low Oregon-grape	10
	Unfavorable	500	Bluebunch wheatgrass	10
			Saskatoon serviceberry	10
			Common chokecherry	10
			Common snowberry	8
			Woods rose	5
			Snowbush ceanothus	5

See footnote at end of table.

TABLE 7.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
50*:				
Selle	Favorable	350	Myrtle pachystima	10
	Normal	250	Sedge	10
	Unfavorable	50	American trailplant	5
			Piper anemone	5
			Goldthread	5
			Columbia brome	5
			Fairybells	5
			Violet	5
			Queencup beadlily	5
Mission	Favorable	250	Goldthread	15
	Normal	200	Violet	10
	Unfavorable	150	Myrtle pachystima	10
			Piper anemone	5
			Fairyslipper orchid	5
			Rose	5
			Queencup beadlily	5
			American trailplant	5
			Fairybells	5
51, 52	Favorable	000	Mallow ninebark	20
Treble	Normal	800	Creambush oceanspray	5
	Unfavorable	500	White spirea	5
			Saskatoon serviceberry	5
			Largeleaf sandwort	5
			Heartleaf arnica	5
			Woods rose	5
			Columbia brome	5
			Common snowberry	5
			Strawberry	5
			Elk sedge	5
53, 54	Favorable	600	Myrtle pachystima	10
Treble	Normal	400	Common snowberry	10
	Unfavorable	100	Longtube twinflower	10
			Pine reedgrass	10
			Sedge	5
			Queencup beadlily	5
			Baldhip rose	5
			American trailplant	5
			Piper anemone	5
			Goldthread	5
			Starry false-solomons-seal	5
55*:				
Treble	Favorable	000	Mallow ninebark	20
	Normal	800	Creambush oceanspray	5
	Unfavorable	500	White spirea	5
			Saskatoon serviceberry	5
			Largeleaf sandwort	5
			Heartleaf arnica	5
			Woods rose	5
			Columbia brome	5
			Common snowberry	5
			Strawberry	5
			Elk sedge	5
Rock outcrop.				

See footnote at end of table.

TABLE 7.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
56*, 57*:				
Treble	Favorable	600	Myrtle pachystima	10
	Normal	400	Common snowberry	10
	Unfavorable	100	Longtube twinflower	10
			Pine reedgrass	10
			Sedge	5
			Queencup beadlily	5
			Baldhip rose	5
			American trailplant	5
			Piper anemone	5
			Goldthread	5
			Starry false-solomons-seal	5
Rock outcrop.				
58	Favorable	400	Myrtle pachystima	10
Vassar	Normal	200	American trailplant	5
	Unfavorable	50	Baldhip rose	5
			Big blueberry	5
			Goldthread	5
			Piper anemone	5
			Fairybells	5
			Starry false-solomons-seal	5
			Bunchberry dogwood	5
			Brackenfern	5
			Common princes pine	5
			Sedge	5
59*:				
Vassar	Favorable	400	Myrtle pachystima	10
	Normal	200	American trailplant	5
	Unfavorable	50	Baldhip rose	5
			Big blueberry	5
			Goldthread	5
			Piper anemone	5
			Fairybells	5
			Starry false-solomons-seal	5
			Bunchberry dogwood	5
			Brackenfern	5
			Common princes pine	5
			Sedge	5
Moscow	Favorable	250	Pine reedgrass	20
	Normal	200	Willow	15
	Unfavorable	150	Common snowberry	15
			Snowbrush ceanothus	15
			Creambush oceanspray	15
			Oregon-grape	10
			Redstem ceanothus	5
			Bearberry	5
60	Favorable	300	American trailplant	10
Vay	Normal	200	Myrtle pachystima	10
	Unfavorable	100	Low Oregon-grape	5
			Elk sedge	5
			Strawberry	5
			Goldthread	5
			Queencup beadlily	5
			Violet	5
			Fairybells	5

See footnote at end of table.

TABLE 7.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
61---------- Vay	Favorable Normal Unfavorable	700 550 400	Common beargrass---------- Big blueberry---------- Myrtle pachystima---------- Rustyleaf menziesia---------- Western thimbleberry---------- Utah honeysuckle---------- Scouler willow---------- Western mountainash---------- Elk sedge---------- Sedge----------	25 10 5 5 5 5 5 5 5 5
62*, 63*: Vay----------	Favorable Normal Unfavorable	300 200 100	American trailplant---------- Myrtle pachystima---------- Low Oregon-grape---------- Elk sedge---------- Strawberry---------- Goldthread---------- Queencup beadlily---------- Violet---------- Fairybells----------	10 10 5 5 5 5 5 5 5
Ardtoo----------	Favorable Normal Unfavorable	300 250 150	Common snowberry---------- Myrtle pachystima---------- Sedge---------- Queencup beadlily---------- Baldhip rose---------- Northern twinflower---------- Piper anemone---------- Columbia brome---------- American trailplant---------- Pacific trillium---------- Starry false-solomons-seal----------	10 10 5 5 5 5 5 5 5 5 5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

[The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil. Only the soils suited to windbreaks and environmental plantings are listed]

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--		
	8-15	16-25	26-35
2---------- Bonner	Siberian peashrub, lilac, Tatarian honeysuckle.	Russian-olive, blue spruce, Norway spruce, Austrian pine, golden willow.	Ponderosa pine, Idahybrid poplar, Douglas-fir.
4---------- Bonner	Siberian peashrub, Rocky Mountain juniper, lilac, western redcedar.	Douglas-fir, Austrian pine, Norway spruce, golden willow.	Western hemlock, ponderosa pine, Scotch pine, Russian-olive.
6, 7---------- Cabinet	---	Douglas-fir, blue spruce, Norway spruce, Austrian pine, Scotch pine.	---
9---------- Colburn	---	Douglas-fir, blue spruce, Norway spruce, Austrian pine, Scotch pine.	---
12---------- Elmira	Siberian peashrub, lilac, Tatarian honeysuckle, Rocky Mountain juniper.	Russian-olive, Siberian elm, green ash, ponderosa pine, Austrian pine.	Idahybrid poplar.
20---------- Kaniksu	Siberian peashrub, lilac, Tatarian honeysuckle, Russian-olive, Austrian pine, Rocky Mountain juniper.	Siberian elm, green ash, ponderosa pine, Idahybrid poplar.	---
23---------- Kootenai	Siberian peashrub, lilac, Tatarian honeysuckle, Russian-olive, Austrian pine, Rocky Mountain juniper.	Siberian elm, Idahybrid poplar, green ash, ponderosa pine.	---
25*: Kootenai----------	Siberian peashrub, lilac, Tatarian honeysuckle, Russian-olive, Austrian pine, Rocky Mountain juniper.	Siberian elm, Idahybrid poplar, green ash, ponderosa pine.	---
Bonner----------	Siberian peashrub, lilac, Tatarian honeysuckle.	Russian-olive, blue spruce, Norway spruce, Austrian pine, golden willow.	Ponderosa pine, Idahybrid poplar, Douglas-fir.
31, 32---------- Mission	---	Douglas-fir, blue spruce, Norway spruce, Austrian pine, Scotch pine.	Idahybrid poplar.
36*: Pend Oreille----------	---	Douglas-fir, blue spruce, Norway spruce, Austrian pine, Scotch pine.	Idahybrid poplar.
43---------- Rathdrum	Tatarian honeysuckle, lilac, Siberian peashrub.	Russian-olive, Norway spruce, blue spruce, Austrian pine, golden willow.	Ponderosa pine, Douglas-fir, Idahybrid poplar.
44---------- Rathdrum	Siberian peashrub, Rocky Mountain juniper, lilac, western redcdear.	Douglas-fir, Austrian pine, Norway spruce, golden willow.	Western hemlock, ponderosa pine, Scotch pine, Russian-olive.

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--		
	8-15	16-25	26-35
45*:			
Rathdrum	Tatarian honeysuckle, lilac, Siberian peashrub.	Russian-olive, Norway spruce, blue spruce, Austrian pine, golden willow.	Ponderosa pine, Douglas-fir, Idahybrid poplar.
Bonner	Siberian peashrub, lilac, Tatarian honeysuckle.	Russian-olive, blue spruce, Norway spruce, Austrian pine, golden willow.	Ponderosa pine, Idahybrid poplar, Douglas-fir.
47 Sagle	---	Douglas-fir, blue spruce, Norway spruce, Austrian pine, Scotch pine.	Idahybrid poplar.
48 Selle	---	Douglas-fir, blue spruce, Norway spruce, Austrian pine, Scotch pine.	---
49*:			
Selle	---	Douglas-fir, blue spruce, Norway spruce, Austrian pine, Scotch pine.	---
Elmira	Siberian peashrub, lilac, Tatarian honeysuckle, Rocky Mountain juniper.	Russian-olive, Siberian elm, green ash, ponderosa pine, Austrian pine.	Idahybrid poplar.
50*:			
Selle	---	Douglas-fir, blue spruce, Norway spruce, Austrian pine, Scotch pine.	---
Mission	---	Douglas-fir, blue spruce, Norway spruce, Austrian pine, Scotch pine.	Idahybrid poplar.
51 Treble	Siberian peashrub, lilac, Tatarian honeysuckle, Russian-olive, Austrian pine, Rocky Mountain juniper.	Siberian elm, green ash, ponderosa pine.	Idahybrid poplar.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1 Ardtoo	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: droughty, slope.
2 Bonner	Moderate: small stones, dusty.	Moderate: small stones, dusty.	Severe: small stones.	Moderate: dusty.	Moderate: small stones.
3 Bonner	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
4 Bonner	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
5*: Brickel	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, large stones.
Rubble land.					
6 Cabinet	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: wetness, erodes easily.	Severe: wetness.
7 Cabinet	Severe: slope, wetness.	Severe: slope, wetness.	Severe: slope, wetness.	Severe: wetness, erodes easily.	Severe: wetness, slope.
8 Capehorn	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, erodes easily.	Severe: wetness, flooding.
9 Colburn	Severe: flooding.	Moderate: wetness.	Moderate: slope, wetness.	Severe: erodes easily.	Slight.
10 Dufort	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
11*: Dufort	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Rock outcrop.					
12 Elmira	Slight	Slight	Moderate: slope.	Slight	Severe: droughty.
13 Elmira Variant	Severe: flooding, wetness.	Moderate: wetness, too sandy.	Severe: wetness.	Moderate: wetness, too sandy.	Severe: droughty.
14*: Haploxeralfs.					
Xerochrepts.					

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
15---------- Hoodoo	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Severe: erodes easily.	Severe: flooding.
16---------- Hun	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
17---------- Jeru	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope.
18---------- Jeru	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.	Severe: slope.
19---------- Jeru	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope.
20---------- Kaniksu	Slight----------	Slight----------	Moderate: slope.	Slight----------	Moderate: droughty.
21, 22---------- Klootch	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
23---------- Kootenai	Moderate: small stones, dusty.	Moderate: small stones, dusty.	Severe: small stones.	Moderate: dusty.	Moderate: small stones, large stones.
24---------- Kootenai	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
25*: Kootenai----------	Moderate: slope, small stones, dusty.	Moderate: slope, small stones, dusty.	Severe: slope, small stones.	Moderate: dusty.	Moderate: small stones, large stones.
Bonner----------	Moderate: small stones, dusty.	Moderate: small stones, dusty.	Severe: small stones.	Moderate: dusty.	Moderate: small stones.
26---------- Kruse	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
27---------- Kruse Variant	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: droughty, slope, thin layer.
28*: Lenz----------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: droughty, slope.
Rock outcrop.					
29, 30---------- Melder	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
31--Mission	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
32--Mission	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: wetness, erodes easily.	Severe: wetness.
33--Mission	Severe: slope, wetness.	Severe: slope, wetness.	Severe: slope, wetness.	Severe: wetness, erodes easily.	Severe: wetness, slope.
34--Odenson	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
35--Pend Oreille	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
36*:					
Pend Oreille	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Hoodoo	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Severe: erodes easily.	Severe: flooding.
37*:					
Pend Oreille	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Rock outcrop.					
38, 39--Priestlake	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: droughty, slope.
40--Prouty	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope, erodes easily.	Severe: slope.
41--Pywell	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness, flooding.	Severe: wetness, excess humus.	Severe: wetness, flooding, excess humus.
42*:					
Pywell	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness, flooding.	Severe: wetness, excess humus.	Severe: wetness, flooding, excess humus.
Hoodoo	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Severe: erodes easily.	Severe: flooding.
43--Rathdrum	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Severe: erodes easily.	Slight.
44--Rathdrum	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
45*:					
Rathdrum	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Severe: erodes easily.	Slight.
Bonner	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
46*:					
Rock outcrop.					
Rubble land.					
47--- Sagle	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
48--- Selle	Slight---	Slight---	Moderate: slope.	Slight---	Moderate: droughty.
49*:					
Selle	Slight---	Slight---	Moderate: slope.	Slight---	Moderate: droughty.
Elmira	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight---	Severe: droughty.
50*:					
Selle	Slight---	Slight---	Severe: slope.	Slight---	Moderate: droughty.
Mission	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
51--- Treble	Moderate: slope.	Moderate: slope.	Severe: slope, small stones.	Slight---	Severe: droughty.
52, 53, 54--- Treble	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: droughty, slope.
55*, 56*, 57*:					
Treble	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: droughty, slope.
Rock outcrop.					
58--- Vassar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
59*:					
Vassar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Moscow	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
60--- Vay	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
61---------- Vay	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
62*, 63*: Vay----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Ardtoo----------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
64---------- Wrencoe	Severe: flooding, wetness, too clayey.	Severe: wetness, too clayey.	Severe: too clayey, wetness, flooding.	Severe: wetness, too clayey.	Severe: wetness, flooding, too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1---- Ardtoo	Very poor.	Very poor.	Fair	Good	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
2---- Bonner	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
3---- Bonner	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
4---- Bonner	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
5*: Brickel----	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.
Rubble land.										
6---- Cabinet	Poor	Poor	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
7---- Cabinet	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
8---- Capehorn	Poor	Fair	Good	Good	Good	Good	Good	Fair	Good	Good.
9---- Colburn	Fair	Fair	Good	Good	Good	Good	Poor	Fair	Good	Fair.
10---- Dufort	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
11*: Dufort----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										
12---- Elmira	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
13---- Elmira Variant	Poor	Poor	Good	Good	Good	Good	Poor	Fair	Good	Fair.
14*: Haploxeralfs.										
Xerochrepts.										
15---- Hoodoo	Poor	Fair	Good	---	Good	Good	Good	Fair	---	Good.
16---- Hun	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
17---- Jeru	Very poor.	Very poor.	Good	Fair	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.
18, 19---- Jeru	Very poor.	Very poor.	Good	Good	Fair	Very poor.	Very poor.	Poor	Good	Very poor.
20---- Kaniksu	Poor	Poor	Good	Fair	Good	Poor	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Conif-erous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
21---------- Klootch	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
22---------- Klootch	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
23---------- Kootenai	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
24---------- Kootenai	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
25*:										
Kootenai----------	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Bonner----------	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
26---------- Kruse	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
27---------- Kruse Variant	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
28*:										
Lenz----------	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Rock outcrop.										
29---------- Melder	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
30---------- Melder	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
31---------- Mission	Fair	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair.
32---------- Mission	Fair	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
33---------- Mission	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
34---------- Odenson	Poor	Fair	Good	Fair	Good	Good	Good	Fair	Fair	Good.
35---------- Pend Oreille	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
36*:										
Pend Oreille------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Hoodoo----------	Poor	Fair	Good	---	Good	Good	Good	Fair	---	Good.
37*:										
Pend Oreille------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										
38---------- Priestlake	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
39---- Priestlake	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
40---- Prouty	Very poor.	Very poor.	Good	Fair	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
41---- Pywell	Poor	Fair	Good	---	Good	Good	Good	Fair	---	Good.
42*:										
Pywell----	Poor	Fair	Good	---	Good	Good	Good	Fair	---	Good.
Hoodoo----	Poor	Fair	Good	---	Good	Good	Good	Fair	---	Good.
43---- Rathdrum	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
44---- Rathdrum	Poor	Poor	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
45*:										
Rathdrum----	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Bonner----	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
46*: Rock outcrop.										
Rubble land.										
47---- Sagle	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
48---- Selle	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
49*:										
Selle----	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Elmira----	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
50*:										
Selle----	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Mission----	Fair	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair.
51---- Treble	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
52---- Treble	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
53---- Treble	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
54---- Treble	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
55*:										
Treble----	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
55*:										
Rock outcrop.										
56*:										
Treble	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										
57*:										
Treble	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop.										
58 Vassar	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
59*:										
Vassar	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Moscow	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
60, 61 Vay	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
62*:										
Vay	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ardtoo	Poor	Fair	Good	Good	Fair	Very poor.	Very poor.	Fair	Good	Very poor.
63*:										
Vay	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Ardtoo	Very poor.	Very poor.	Good	Good	Fair	Very poor.	Very poor.	Poor	Good	Very poor.
64 Wrencoe	Very poor.	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Fair.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1---------- Ardtoo	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
2---------- Bonner	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Severe: frost action.	Moderate: small stones.
3---------- Bonner	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
4---------- Bonner	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Severe: frost action.	Slight.
5*: Brickel----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, large stones.
Rubble land.						
6---------- Cabinet	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
7---------- Cabinet	Severe: wetness, slope.	Severe: wetness, slope.	Severe: wetness, slope.	Severe: wetness, slope.	Severe: low strength, wetness, slope.	Severe: wetness, slope.
8---------- Capehorn	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.	Severe: wetness, flooding.
9---------- Colburn	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: frost action.	Slight.
10---------- Dufort	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
11*: Dufort----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
Rock outcrop.						
12---------- Elmira	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Severe: droughty.
13---------- Elmira Variant	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Moderate: wetness, flooding, frost action.	Severe: droughty.
14*: Haploxeralfs.						
Xerochrepts.						

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
15---------- Hoodoo	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
16---------- Hun	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
17---------- Jeru	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
18, 19---------- Jeru	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
20---------- Kaniksu	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: droughty.
21, 22---------- Klootch	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
23---------- Kootenai	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Moderate: small stones, large stones.
24---------- Kootenai	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
25*: Kootenai---------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, large stones.
Bonner----------	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Severe: frost action.	Moderate: small stones.
26---------- Kruse	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
27---------- Kruse Variant	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope, thin layer.
28*: Lenz----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Rock outcrop.						
29, 30---------- Melder	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
31, 32---------- Mission	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
33---------- Mission	Severe: cutbanks cave, wetness, slope.	Severe: wetness, slope, slippage.	Severe: wetness, slope, slippage.	Severe: wetness, slope, slippage.	Severe: wetness, slope, frost action.	Severe: wetness, slope.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
34---------- Odenson	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
35---------- Pend Oreille	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
36*: Pend Oreille-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
Hoodoo----------	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
37*: Pend Oreille-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
Rock outcrop.						
38, 39---------- Priestlake	Severe: cutbanks cave, slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: droughty, slope.
40---------- Prouty	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
41---------- Pywell	Severe: excess humus, wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: wetness, flooding, frost action.	Severe: wetness, flooding, excess humus.
42*: Pywell----------	Severe: excess humus, wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: wetness, flooding, frost action.	Severe: wetness, flooding, excess humus.
Hoodoo----------	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
43---------- Rathdrum	Slight---------	Slight---------	Slight---------	Slight---------	Severe: frost action.	Slight.
44---------- Rathdrum	Slight---------	Slight---------	Slight---------	Moderate: slope.	Severe: frost action.	Slight.
45*: Rathdrum---------	Slight---------	Slight---------	Slight---------	Slight---------	Severe: frost action.	Slight.
Bonner----------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Severe: frost action.	Slight.
46*: Rock outcrop.						
Rubble land.						

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
47---------- Sagle	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
48---------- Selle	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Moderate: droughty.
49*:						
Selle----------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Moderate: droughty.
Elmira----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
50*:						
Selle----------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Moderate: droughty.
Mission----------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
51---------- Treble	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Severe: droughty.
52, 53, 54-------- Treble	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
55*, 56*, 57*:						
Treble----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Rock outcrop.						
58---------- Vassar	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
59*:						
Vassar----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
Moscow----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
60, 61---------- Vay	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
62*, 63*:						
Vay----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
Ardtoo----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
64---------- Wrencoe	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding, too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1 Ardtoo	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
2 Bonner	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
3 Bonner	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
4 Bonner	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
5*: Brickel	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, large stones, slope.
Rubble land.					
6 Cabinet	Severe: wetness, percs slowly.	Severe: seepage, slope, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: too clayey, wetness.
7 Cabinet	Severe: wetness, percs slowly, slope.	Severe: seepage, slope, wetness.	Severe: seepage, wetness, slope.	Severe: seepage, wetness, slope.	Poor: too clayey, slope, wetness.
8 Capehorn	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
9 Colburn	Severe: wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy.
10 Dufort	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
11*: Dufort	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Rock outcrop.					
12 Elmira	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
13---------- Elmira Variant	Severe: wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
14*: Haploxeralfs. Xerochrepts.					
15---------- Hoodoo	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
16---------- Hun	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
17---------- Jeru	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: large stones, slope.
18, 19---------- Jeru	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: large stones, slope.
20---------- Kaniksu	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
21, 22---------- Klootch	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
23---------- Kootenai	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
24---------- Kootenai	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
25*: Kootenai----------	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Bonner----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
26---------- Kruse	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
27---------- Kruse Variant	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock, seepage.	Poor: area reclaim, small stones.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
28*:					
Lenz	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
Rock outcrop.					
29, 30--- Melder	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
31--- Mission	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, wetness.
32--- Mission	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, wetness.
33--- Mission	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: wetness, slope, too clayey.	Severe: wetness, slope.	Poor: too clayey, slope, wetness.
34--- Odenson	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
35--- Pend Oreille	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
36*:					
Pend Oreille	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Hoodoo	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
37*:					
Pend Oreille	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Rock outcrop.					
38, 39--- Priestlake	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
40--- Prouty	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
41--- Pywell	Severe: flooding, wetness.	Severe: flooding, excess humus, wetness.	Severe: flooding, wetness, excess humus.	Severe: flooding, wetness.	Poor: wetness, excess humus.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
42*:					
Pywell	Severe: flooding, wetness.	Severe: flooding, excess humus, wetness.	Severe: flooding, wetness, excess humus.	Severe: flooding, wetness.	Poor: wetness, excess humus.
Hoodoo	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
43--- Rathdrum	Slight	Moderate: seepage.	Slight	Slight	Poor: hard to pack.
44--- Rathdrum	Slight	Moderate: seepage, slope.	Slight	Slight	Poor: hard to pack.
45*:					
Rathdrum	Slight	Moderate: seepage.	Slight	Slight	Poor: hard to pack.
Bonner	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
46*:					
Rock outcrop.					
Rubble land.					
47--- Sagle	Severe: wetness, slope.	Severe: seepage, slope, wetness.	Severe: seepage, wetness, slope.	Severe: seepage, wetness, slope.	Poor: small stones, slope.
48--- Selle	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
49*:					
Selle	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Elmira	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
50*:					
Selle	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Mission	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, wetness.
51--- Treble	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
52, 53, 54--- Treble	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
55*, 56*, 57*: Treble	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
Rock outcrop.					
58 Vassar	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
59*: Vassar	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: deptn to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
Moscow	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
60 Vay	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope.	Poor: small stones, slope.
61 Vay	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
62*, 63*: Vay	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope.	Poor: small stones, slope.
Ardtoo	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
64 Wrencoe	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1 Ardtoo	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
2 Bonner	Good	Probable	Probable	Poor: small stones, area reclaim.
3 Bonner	Poor: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
4 Bonner	Good	Probable	Probable	Poor: small stones, area reclaim.
5*: Brickel	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope, area reclaim.
Rubble land.				
6 Cabinet	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
7 Cabinet	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness, slope.
8 Capehorn	Poor: wetness.	Probable	Probable	Poor: small stones, area reclaim, wetness.
9 Colburn	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
10 Dufort	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
11*: Dufort	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop.				
12 Elmira	Good	Probable	Improbable: too sandy.	Poor: thin layer.
13 Elmira Variant	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
14*: Haploxeralfs. Xerochrepts.				
15--- Hoodoo	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
16--- Hun	Poor: slope.	Improbable: large stones.	Improbable: large stones.	Poor: small stones, area reclaim, slope.
17--- Jeru	Poor: slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones, slope.
18--- Jeru	Fair: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor area reclaim, small stones, slope.
19--- Jeru	Poor: slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones, slope.
20--- Kaniksu	Good---	Probable---	Probable---	Poor: small stones.
21, 22--- Klootch	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
23--- Kootenai	Good---	Improbable: small stones.	Probable---	Poor: small stones, area reclaim.
24--- Kootenai	Poor: slope.	Improbable: small stones.	Probable---	Poor: small stones, area reclaim, slope.
25*: Kootenai---	Good---	Improbable: small stones.	Probable---	Poor: small stones, area reclaim.
Bonner---	Good---	Probable---	Probable---	Poor: small stones, area reclaim.
26--- Kruse	Poor: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
27--- Kruse Variant	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
28*: Lenz---	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Rock outcrop.				

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
29, 30---------- Melder	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
31, 32---------- Mission	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
33---------- Mission	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, slope.
34---------- Odenson	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
35---------- Pend Oreille	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
36*: Pend Oreille----------	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Hoodoo----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
37*: Pend Oreille----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop.				
38, 39---------- Priestlake	Poor: slope.	Probable----------	Probable----------	Poor: small stones, area reclaim, slope.
40---------- Prouty	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, large stones, slope.
41---------- Pywell	Poor: wetness, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
42*: Pywell----------	Poor: wetness, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
Hoodoo----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
43---------- Rathdrum	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
44---------- Rathdrum	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
45*:				
Rathdrum	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Bonner	Good	Probable	Probable	Poor: small stones, area reclaim.
46*:				
Rock outcrop.				
Rubble land.				
47				
Sagle	Fair: wetness, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
48				
Selle	Good	Probable	Improbable: too sandy.	Fair: thin layer.
49*:				
Selle	Good	Probable	Improbable: too sandy.	Fair: thin layer.
Elmira	Good	Probable	Improbable: too sandy.	Poor: thin layer.
50*:				
Selle	Good	Probable	Improbable: too sandy.	Fair: thin layer.
Mission	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
51				
Treble	Good	Probable	Probable	Poor: small stones, area reclaim.
52, 53, 54				
Treble	Poor: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
55*, 56*, 57*:				
Treble	Poor: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
Rock outcrop.				
58				
Vassar	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
59*:				
Vassar	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Moscow	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
60---------- Vay	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
61---------- Vay	Poor: slope.	Improbable: large stones.	Improbable: large stones.	Poor: small stones, area reclaim, slope.
62*, 63*: Vay----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Ardtoo----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
64---------- Wrencoe	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1---------- Ardtoo	Severe: seepage, slope.	Severe: seepage.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
2---------- Bonner	Severe: seepage.	Severe: seepage.	Deep to water	Favorable------	Large stones, too sandy.	Large stones.
3---------- Bonner	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope----------	Slope, large stones, too sandy.	Large stones, slope.
4---------- Bonner	Severe: seepage.	Severe: seepage.	Deep to water	Erodes easily	Large stones, erodes easily, too sandy.	Large stones, erodes easily.
5*: Brickel----------	Severe: slope.	Severe: piping, large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Rubble land.						
6---------- Cabinet	Severe: seepage.	Severe: piping, wetness.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness.	Wetness, erodes easily.
7---------- Cabinet	Severe: seepage, slope.	Severe: piping, wetness.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.
8---------- Capehorn	Severe: seepage.	Severe: seepage, wetness.	Flooding, large stones, frost action.	Wetness, droughty, erodes easily.	Large stones, erodes easily, wetness.	Large stones, wetness, erodes easily.
9---------- Colburn	Severe: seepage.	Severe: piping.	Frost action, cutbanks cave.	Wetness, soil blowing.	Erodes easily, wetness, too sandy.	Erodes easily.
10---------- Dufort	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, erodes easily.	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
11*: Dufort----------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, erodes easily.	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
Rock outcrop.						
12---------- Elmira	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
13---------- Elmira Variant	Severe: seepage.	Severe: seepage, piping, wetness.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
14*: Haploxeralfs.						
Xerochrepts.						

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
15---------- Hoodoo	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
16---------- Hun	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones, too sandy.	Large stones, slope, droughty.
17---------- Jeru	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones, too sandy.	Large stones, slope, droughty.
18, 19---------- Jeru	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones, too sandy.	Large stones, slope, droughty.
20---------- Kaniksu	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, soil blowing.	Erodes easily, too sandy.	Erodes easily, droughty.
21, 22---------- Klootch	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
23---------- Kootenai	Severe: seepage.	Severe: seepage.	Deep to water	Droughty-------	Large stones, too sandy.	Large stones, droughty.
24---------- Kootenai	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, large stones, too sandy.	Large stones, slope, droughty.
25*: Kootenai---------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, large stones, too sandy.	Large stones, slope, droughty.
Bonner----------	Severe: seepage.	Severe: seepage.	Deep to water	Favorable------	Large stones, too sandy.	Large stones.
26---------- Kruse	Severe: slope.	Severe: thin layer.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
27---------- Kruse Variant	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Erodes easily, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, erodes easily.
28*: Lenz----------	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						
29, 30---------- Melder	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Droughty, slope, erodes easily.	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
31---------- Mission	Slight---------	Severe: piping, wetness.	Percs slowly, frost action.	Wetness, percs slowly, rooting depth.	Erodes easily, wetness.	Wetness, erodes easily.
32---------- Mission	Moderate: slope.	Severe: piping, wetness.	Percs slowly, frost action, slope.	Wetness, percs slowly, rooting depth.	Erodes easily, wetness.	Wetness, erodes easily.
33---------- Mission	Severe: slope.	Severe: piping, wetness.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
34---------- Odenson	Slight---------	Severe: piping, wetness.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Percs slowly, erodes easily, wetness.	Wetness, erodes easily, percs slowly.
35---------- Pend Oreille	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Slope, erodes easily.	Slope, large stones, erodes easily.	Slope, erodes easily.
36*: Pend Oreille-----	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Slope, erodes easily.	Slope, large stones, erodes easily.	Slope, erodes easily.
Hoodoo----------	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
37*: Pend Oreille-----	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Slope, erodes easily.	Slope, large stones, erodes easily.	Slope, erodes easily.
Rock outcrop.						
38, 39---------- Priestlake	Severe: seepage, slope.	Severe: seepage.	Deep to water	Large stones, droughty, slope.	Slope, large stones, too sandy.	Large stones, slope, droughty.
40---------- Prouty	Severe: seepage, slope.	Severe: seepage.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
41---------- Pywell	Moderate: seepage.	Severe: excess humus, wetness.	Flooding, subsides, frost action.	Wetness, soil blowing, flooding.	Wetness, soil blowing.	Wetness.
42*: Pywell----------	Moderate: seepage.	Severe: excess humus, wetness.	Flooding, subsides, frost action.	Wetness, soil blowing, flooding.	Wetness, soil blowing.	Wetness.
Hoodoo----------	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
43---------- Rathdrum	Moderate: seepage.	Severe: piping, hard to pack.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
44---------- Rathdrum	Moderate: seepage, slope.	Severe: piping, hard to pack.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
45*: Rathdrum---------	Moderate: seepage.	Severe: piping, hard to pack.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
Bonner----------	Severe: seepage.	Severe: seepage.	Deep to water	Slope, erodes easily.	Large stones, erodes easily, too sandy.	Large stones, erodes easily.
46*: Rock outcrop.						
Rubble land.						

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
47---------- Sagle	Severe: seepage, slope.	Severe: seepage.	Large stones, frost action, slope.	Wetness, slope, erodes easily.	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
48---------- Selle	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing, slope.	Too sandy, soil blowing.	Droughty.
49*: Selle----------	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing, slope.	Too sandy, soil blowing.	Droughty.
Elmira----------	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
50*: Selle----------	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing, slope.	Too sandy, soil blowing.	Droughty.
Mission----------	Slight---------	Severe: piping, wetness.	Percs slowly, frost action.	Wetness, percs slowly, rooting depth.	Erodes easily, wetness.	Wetness, erodes easily.
51, 52, 53, 54---- Treble	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, large stones, too sandy.	Large stones, slope, droughty.
55*, 56*, 57*: Treble----------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, large stones, too sandy.	Large stones, slope, droughty.
Rock outcrop.						
58---------- Vassar	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
59*: Vassar----------	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Moscow----------	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
60---------- Vay	Severe: seepage, slope.	Severe: seepage.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope.
61---------- Vay	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
62*, 63*: Vay----------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Large stones, droughty, slope.	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
Ardtoo----------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
64---------- Wrencoe	Slight---------	Severe: wetness.	Percs slowly, flooding, frost action.	Wetness, slow intake, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1---------- Ardtoo	0-12	Gravelly sandy loam.	SM	A-1, A-2	0	65-80	60-75	35-50	15-30	---	NP
	12-45	Very gravelly coarse sandy loam, very cobbly sandy loam, extremely cobbly sandy loam.	SM, GM	A-1, A-2, A-3	0-40	45-75	40-70	20-55	10-35	---	NP
	45	Weathered bedrock	---	---	---	---	---	---	---	---	---
2, 3---------- Bonner	0-5	Gravelly silt loam.	ML, GM	A-4	0-15	55-75	50-70	45-70	40-65	---	NP
	5-21	Gravelly silt loam, gravelly loam, silt loam.	ML, GM, SM	A-4	0-15	60-90	55-85	50-80	40-70	---	NP
	21-29	Gravelly loam, gravelly sandy loam.	SM, GM	A-2, A-4, A-1	0-15	55-80	50-75	35-65	20-50	---	NP
	29-60	Very gravelly loamy sand, extremely gravelly coarse sand, very gravelly sand.	SM, GM, SP-SM, GP-GM	A-1	0-30	35-60	30-55	20-30	5-15	---	NP
4---------- Bonner	0-5	Silt loam--------	ML	A-4	0-5	85-100	85-100	70-95	55-80	---	NP
	5-21	Gravelly silt loam, gravelly loam, silt loam.	ML, GM, SM	A-4	0-15	60-90	55-85	50-80	40-70	---	NP
	21-29	Gravelly loam, gravelly sandy loam.	SM, GM	A-2, A-4, A-1	0-15	55-80	50-75	35-65	20-50	---	NP
	29-60	Very gravelly loamy sand, extremely gravelly coarse sand, very gravelly sand.	SM, GM, SP-SM, GP-GM	A-1	0-30	35-60	30-55	20-30	5-15	---	NP
5*:											
Brickel---------	0-7	Stony loam--------	SM, ML	A-4	5-15	75-85	70-85	45-80	40-65	20-30	NP-5
	7-15	Very stony silt loam, very stony loam, very stony sandy loam.	SM, ML, GM	A-4, A-2	35-60	60-75	55-70	45-65	30-55	20-30	NP-5
	15-27	Very cobbly silt loam, very cobbly loam, extremely stony sandy loam.	GM, SM	A-4, A-2	50-65	60-75	55-70	35-65	25-50	20-30	NP-5
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rubble land.											
6, 7---------- Cabinet	0-11	Silt loam--------	ML	A-4	0	95-100	90-100	80-100	65-90	20-30	NP-5
	11-19	Silty clay loam	CL, CL-ML	A-6, A-4	0	95-100	95-100	90-100	80-95	25-40	5-20
	19-35	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-95	40-55	25-40
	35-60	Stratified very fine sandy loam to clay.	CL, CL-ML	A-4, A-5, A-6, A-7	0	100	100	90-100	65-90	25-50	5-30

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
8----------	0-7	Silt loam--------	ML	A-4	0	75-100	75-100	65-95	60-80	---	NP
Capehorn	7-15	Gravelly silt loam, silt loam, very fine sandy loam.	ML, GM, SM	A-4	0	65-95	60-90	55-85	40-65	---	NP
	15-60	Very gravelly loamy sand, very gravelly sand.	GP-GM, GP, SP-SM, SP	A-1	0-30	35-65	30-60	15-35	0-15	---	NP
9----------	0-3	Very fine sandy loam.	ML	A-4	0	100	100	85-95	60-65	---	NP
Colburn	3-24	Very fine sandy loam, fine sandy loam, silt loam.	ML	A-4	0	100	100	75-95	50-75	---	NP
	24-60	Loamy fine sand, fine sand, loamy sand.	SM	A-2	0	95-100	90-100	55-75	20-35	---	NP
10----------	0-13	Silt loam--------	ML	A-4	0	95-100	85-100	80-95	70-90	---	NP
Dufort	13-24	Gravelly silt loam, gravelly loam, silt loam.	GM, ML	A-4	0-10	60-75	55-70	50-65	40-55	---	NP
	24-60	Very gravelly sandy loam, very cobbly sandy loam, very gravelly fine sandy loam.	GM, SM	A-1	15-45	40-60	35-55	20-35	15-20	---	NP
11*:											
Dufort----------	0-13	Silt loam--------	ML	A-4	0	95-100	85-100	80-95	70-90	---	NP
	13-24	Gravelly silt loam, gravelly loam, silt loam.	GM, ML	A-4	0-10	60-75	55-70	50-65	40-55	---	NP
	24-60	Very gravelly sandy loam, very cobbly sandy loam, very gravelly fine sandy loam.	GM, SM	A-1	15-45	40-60	35-55	20-35	15-20	---	NP
Rock outcrop.											
12----------	0-4	Loamy sand-------	SM	A-2	0	100	100	65-75	20-35	---	NP
Elmira	4-60	Loamy sand, sand, loamy fine sand.	SM, SP-SM	A-2, A-3	0	100	100	60-75	5-30	---	NP
13----------	0-8	Loamy coarse sand	SM	A-2, A-1	0	100	90-100	45-55	15-25	---	NP
Elmira Variant	8-60	Coarse sand, sand, gravelly coarse sand.	SP-SM, SP	A-1	0	85-100	70-100	35-50	0-10	---	NP
14*:											
Haploxeralfs.											
Xerochrepts.											
15----------	0-15	Silt loam--------	ML	A-5, A-4	0	100	100	90-100	70-90	30-50	NP-5
Hoodoo	15-52	Silt loam, very fine sandy loam.	ML	A-5, A-4	0	100	100	90-95	60-80	30-50	NP-5
	52-60	Very cobbly silty clay loam, extremely gravelly silt loam.	CL, GC	A-6, A-2	15-55	40-70	35-65	30-60	25-55	25-40	10-20

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
16---------- Hun	0-9	Gravelly silt loam.	ML, GM	A-4	0	60-75	55-70	50-65	45-60	---	NP
	9-25	Very gravelly sandy loam.	GM	A-1	10-35	35-60	30-55	20-35	10-20	---	NP
	25-55	Extremely cobbly loamy sand, extremely cobbly coarse sand, very cobbly loamy sand.	GP-GM, SP-SM	A-1	45-65	30-60	25-55	10-30	5-10	---	NP
	55	Weathered bedrock	---	---	---	---	---	---	---	---	---
17---------- Jeru	0-6	Very stony loam	GM, SM, ML	A-4	10-30	60-85	55-80	50-70	35-55	---	NP
	6-23	Gravelly loam, very gravelly loam.	SM, GM	A-4, A-2, A-1	10-30	60-75	55-70	35-65	20-50	---	NP
	23-32	Very cobbly sandy loam, very stony sandy loam.	SM, GM	A-1, A-2	30-55	55-75	50-70	30-45	15-35	---	NP
	32-60	Very stony sandy loam, very stony loamy sand, extremely cobbly sandy loam.	SM, GM	A-1, A-2	45-65	55-75	50-70	25-40	10-30	---	NP
18, 19---------- Jeru	0-6	Very stony sandy loam.	SM	A-2, A-1	10-30	60-85	55-80	35-50	20-30	---	NP
	6-23	Gravelly sandy loam, very gravelly sandy loam, very cobbly sandy loam.	SM, GM	A-2, A-1	10-40	60-75	55-70	35-50	20-30	---	NP
	23-32	Very cobbly sandy loam, very stony sandy loam.	SM, GM	A-1, A-2	30-55	55-75	50-70	30-45	15-35	---	NP
	32-60	Very stony sandy loam, very stony loamy sand, extremely cobbly sandy loam.	SM, GM	A-1, A-2	45-65	55-75	50-70	25-40	10-30	---	NP
20---------- Kaniksu	0-7	Sandy loam-------	SM, ML	A-4, A-2	0	95-100	90-100	55-85	25-55	---	NP
	7-19	Sandy loam, fine sandy loam.	SM, ML	A-4, A-2	0	80-100	75-100	50-80	30-55	---	NP
	19-26	Gravelly loamy sand, loamy sand.	SM	A-1	0	75-100	70-95	40-70	10-25	---	NP
	26-60	Gravelly loamy sand, gravelly sand, loamy sand.	SM, SP-SM	A-1	0-5	60-90	55-85	30-50	5-25	---	NP
21, 22---------- Klootch	0-5	Gravelly sandy loam.	SM, GM	A-1	0-10	60-75	55-70	35-45	20-25	---	NP
	5-26	Very gravelly sandy loam, very cobbly sandy loam.	GM	A-1, A-2	10-45	35-60	30-55	15-45	10-35	---	NP
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
23, 24---------- Kootenai	0-5	Gravelly silt loam.	ML, GM	A-4	0-10	60-80	55-75	50-70	40-65	---	NP
	5-22	Gravelly silt loam, gravelly loam, gravelly sandy loam.	SM, GM	A-4, A-2, A-1	0-10	55-75	50-70	35-65	20-50	---	NP
	22-26	Very gravelly sandy loam, very gravelly loam.	GM	A-1, A-2	10-25	45-60	40-55	25-45	10-35	---	NP
	26-60	Extremely gravelly coarse sand, extremely gravelly loamy coarse sand, very cobbly coarse sand.	GP	A-1	10-45	15-30	10-25	5-15	0-5	---	NP
25*: Kootenai--------	0-5	Gravelly silt loam.	ML, GM	A-4	0-10	60-80	55-75	50-70	40-65	---	NP
	5-22	Gravelly silt loam, gravelly loam, gravelly sandy loam.	SM, GM	A-4, A-2, A-1	0-10	55-75	50-70	35-65	20-50	---	NP
	22-26	Very gravelly sandy loam, very gravelly loam.	GM	A-1, A-2	10-25	45-60	40-55	25-45	10-35	---	NP
	26-60	Extremely gravelly coarse sand, extremely gravelly loamy coarse sand, very cobbly coarse sand.	GP	A-1	10-45	15-30	10-25	5-15	0-5	---	NP
Bonner----------	0-5	Gravelly silt loam.	ML, GM	A-4	0-15	55-75	50-70	45-70	40-65	---	NP
	5-21	Gravelly silt loam, gravelly loam, silt loam.	ML, GM, SM	A-4	0-15	60-90	55-85	50-80	40-70	---	NP
	21-29	Gravelly loam, gravelly sandy loam.	SM, GM	A-2, A-4, A-1	0-15	55-80	50-75	35-65	20-50	---	NP
	29-60	Very gravelly loamy sand, extremely gravelly coarse sand, very gravelly sand.	SM, GM, SP-SM, GP-GM	A-1	0-30	35-60	30-55	20-30	5-15	---	NP
26---------- Kruse	0-15	Silt loam--------	CL-ML	A-4	0	95-100	95-100	80-100	65-90	20-30	5-10
	15-51	Clay loam, silty clay loam, loam.	CL	A-6	0	80-100	75-100	70-100	55-85	25-35	10-20
	51-60	Gravelly clay loam, loam, gravelly sandy loam.	CL, SC, SM-SC, CL-ML	A-4, A-6, A-2	0-15	75-100	70-100	60-90	30-60	20-30	5-15
27---------- Kruse Variant	0-10	Silt loam--------	ML	A-4	0	80-95	75-90	65-85	50-70	---	NP
	10-28	Very gravelly sandy loam, very gravelly loam, gravelly sandy loam.	GM, SM	A-4, A-1, A-2	15-40	55-80	50-75	35-65	20-50	20-25	NP-5
	28-38	Gravelly sandy clay loam.	GC, SC	A-2, A-6	0-5	55-80	50-75	45-65	30-40	25-30	10-15
	38	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
28*:											
Lenz	0-7	Stony sandy loam	SM	A-1, A-2	10-20	65-80	60-75	35-50	15-30	---	NP
	7-24	Very gravelly sandy loam, extremely gravelly sandy loam, very cobbly sandy loam.	GM	A-1, A-2	10-50	30-55	25-50	15-40	10-30	---	NP
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
29, 30	0-9	Loam	ML	A-4	0	85-100	80-100	65-90	50-75	---	NP
Melder	9-33	Very gravelly clay loam, gravelly loam, very gravelly loam.	SM-SC, GM-GC, GC, SC	A-2, A-4, A-6	0-15	50-80	45-75	40-65	30-50	25-40	5-15
	33-60	Very gravelly sandy loam, very cobbly sandy loam, very stony sandy loam.	GM-GC	A-2, A-1	15-55	30-55	25-50	15-35	10-20	20-30	5-10
31, 32, 33	0-11	Silt loam	ML, MH	A-5, A-4	0	100	100	95-100	75-90	40-60	NP-5
Mission	11-20	Silt loam, silty clay loam.	CL	A-6	0	100	100	95-100	75-95	25-35	10-15
	20-32	Silt, silt loam, very fine sandy loam.	ML	A-4	0	100	100	95-100	65-95	20-25	NP-5
	32-47	Silt loam, silty clay loam, silty clay.	CL, CL-ML	A-6, A-7, A-4, A-5	0	100	100	95-100	70-95	25-45	5-25
	47-60	Stratified fine sand to silty clay.	CL, ML	A-6, A-4, A-5, A-7	0	100	100	85-95	50-80	15-45	NP-25
34	0-9	Silt loam	ML	A-4	0	100	100	90-100	70-90	15-25	NP-5
Odenson	9-35	Silty clay loam, silt loam.	CL-ML, CL	A-4, A-6	0	100	100	90-100	70-95	20-35	5-15
	35-60	Stratified very fine sandy loam to silty clay.	ML, CL, CL-ML	A-4, A-5, A-6, A-7	0	100	100	85-100	60-90	20-45	NP-25
35	0-13	Silt loam	ML	A-4	0	75-100	70-100	70-95	60-80	---	NP
Pend Oreille	13-17	Silt loam, loam, gravelly silt loam.	ML, SM	A-4	0-10	75-100	65-95	55-85	45-75	---	NP
	17-41	Gravelly sandy loam, cobbly sandy loam.	GM, SM	A-1, A-2	0-10	60-85	55-80	35-50	20-30	---	NP
	41-60	Very cobbly sandy loam, very gravelly sandy loam, gravelly sandy loam.	GM, SM	A-1, A-2	10-45	55-85	50-80	30-50	15-30	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
36*:											
Pend Oreille----	0-13	Silt loam--------	ML	A-4	0	75-100	70-100	70-95	60-80	---	NP
	13-17	Silt loam, loam, gravelly silt loam.	ML, SM	A-4	0-10	75-100	65-95	55-85	45-75	---	NP
	17-41	Gravelly sandy loam, cobbly sandy loam.	GM, SM	A-1, A-2	0-10	60-85	55-80	35-50	20-30	---	NP
	41-60	Very cobbly sandy loam, very gravelly sandy loam, gravelly sandy loam.	GM, SM	A-1, A-2	10-45	55-85	50-80	30-50	15-30	---	NP
Hoodoo----------	0-15	Silt loam--------	ML	A-5, A-4	0	100	100	90-100	70-90	30-50	NP-5
	15-52	Silt loam, very fine sandy loam.	ML	A-5, A-4	0	100	100	90-95	60-80	30-50	NP-5
	52-60	Very cobbly silty clay loam, extremely gravelly silt loam.	CL, GC	A-6, A-2	15-55	40-70	35-65	30-60	25-55	25-40	10-20
37*:											
Pend Oreille----	0-13	Silt loam--------	ML	A-4	0	75-100	70-100	70-95	60-80	---	NP
	13-17	Silt loam, loam, gravelly silt loam.	ML, SM	A-4	0-10	75-100	65-95	55-85	45-75	---	NP
	17-41	Gravelly sandy loam, cobbly sandy loam.	GM, SM	A-1, A-2	0-10	60-85	55-80	35-50	20-30	---	NP
	41-60	Very cobbly sandy loam, very gravelly sandy loam, gravelly sandy loam.	GM, SM	A-1, A-2	10-45	55-85	50-80	30-50	15-30	---	NP
Rock outcrop.											
38, 39---------- Priestlake	0-12	Gravelly sandy loam.	SM	A-1, A-2	0-10	60-80	55-75	30-50	15-30	---	NP
	12-23	Very gravelly sandy loam, very gravelly coarse sandy loam.	GM	A-1	0-15	40-55	35-50	15-35	10-20	---	NP
	23-60	Very gravelly loamy sand, very gravelly sand, extremely cobbly loamy sand.	GM, GP-GM	A-1	10-55	40-55	35-50	15-35	5-15	---	NP
40---------- Prouty	0-18	Gravelly loam----	SM, GM	A-4	0-10	55-75	50-70	45-60	35-45	30-40	NP-5
	18-37	Extremely stony sandy loam, very gravelly sandy loam, very cobbly sandy loam.	GM, SM	A-1	15-55	35-65	30-60	15-40	10-25	---	NP
	37	Weathered bedrock	---	---	---	---	---	---	---	---	---
41---------- Pywell	0-10	Muck----------	PT	A-8	0	---	---	---	---	---	NP
	10-60	Sapric material, peat, muck.	PT	A-8	0-20	---	---	---	---	---	NP
42*:											
Pywell----------	0-10	Muck----------	PT	A-8	0	---	---	---	---	---	NP
	10-60	Sapric material, peat, muck.	PT	A-8	0-20	---	---	---	---	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
42*:											
Hoodoo	0-15	Silt loam	ML	A-5, A-4	0	100	100	90-100	70-90	30-50	NP-5
	15-52	Silt loam, very fine sandy loam.	ML	A-5, A-4	0	100	100	90-95	60-80	30-50	NP-5
	52-60	Very cobbly silty clay loam, extremely gravelly silt loam.	CL, GC	A-6, A-2	15-55	40-70	35-65	30-60	25-55	25-40	10-20
43	0-17	Silt loam	ML, MH	A-5	0	95-100	90-100	80-100	65-90	40-60	NP-5
Rathdrum	17-55	Silt loam, very fine sandy loam.	ML, MH	A-5	0	95-100	90-100	80-100	50-80	40-60	NP-5
	55-60	Silt loam, gravelly silt loam, very fine sandy loam.	MH, ML, GM, SM	A-5	0-20	65-95	60-90	50-80	40-70	40-60	NP-5
44	0-17	Silt loam	ML, MH	A-5	0	95-100	90-100	80-100	65-90	40-60	NP-5
Rathdrum	17-55	Silt loam, very fine sandy loam.	ML, MH	A-5	0	85-100	80-100	70-100	50-80	40-60	NP-5
	55-60	Silt loam, gravelly silt loam, very fine sandy loam.	ML, MH, GM, SM	A-5, A-2	0	60-90	55-85	45-70	30-60	40-60	NP-5
45*:											
Rathdrum	0-17	Silt loam	ML, MH	A-5	0	95-100	90-100	80-100	65-90	40-60	NP-5
	17-55	Silt loam, very fine sandy loam.	ML, MH	A-5	0	95-100	90-100	80-100	50-80	40-60	NP-5
	55-60	Silt loam, gravelly silt loam, very fine sandy loam.	MH, ML, GM, SM	A-5	0-20	65-95	60-90	50-80	40-70	40-60	NP-5
Bonner	0-5	Silt loam	ML	A-4	0-5	85-100	85-100	70-95	55-80	---	NP
	5-21	Gravelly silt loam, gravelly loam, silt loam.	ML, GM, SM	A-4	0-15	60-90	55-85	50-80	40-70	---	NP
	21-29	Gravelly loam, gravelly sandy loam.	SM, GM	A-2, A-4, A-1	0-15	55-80	50-75	35-65	20-50	---	NP
	29-60	Very gravelly loamy sand, extremely gravelly coarse sand, very gravelly sand.	SM, GM, SP-SM, GP-GM	A-1	0-30	35-60	30-55	20-30	5-15	---	NP
46*:											
Rock outcrop.											
Rubble land.											
47	0-15	Silt loam	ML	A-4	0	80-100	75-100	70-95	60-85	---	NP
Sagle	15-21	Gravelly silt loam, very gravelly silt loam.	ML, GM	A-4	0-10	55-75	50-70	50-70	45-60	---	NP
	21-60	Very gravelly sandy loam, extremely gravelly sandy loam.	GM, SM	A-1	10-40	40-60	35-55	20-30	10-15	---	NP
48	0-20	Fine sandy loam	SM	A-4	0	100	100	85-95	40-50	---	NP
Selle	20-60	Loamy fine sand, fine sand, sand.	SM, SP-SM	A-2	0	100	100	60-90	5-35	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
49*:											
Selle	0-20	Fine sandy loam	SM	A-4	0	100	100	85-95	40-50	---	NP
	20-60	Loamy fine sand, fine sand, sand.	SM, SP-SM	A-2	0	100	100	60-90	5-35	---	NP
Elmira	0-4	Loamy sand	SM	A-2	0	100	100	65-75	20-35	---	NP
	4-60	Loamy sand, sand, loamy fine sand.	SM, SP-SM	A-2, A-3	0	100	100	60-75	5-30	---	NP
50*:											
Selle	0-20	Fine sandy loam	SM	A-4	0	100	100	85-95	40-50	---	NP
	20-60	Loamy fine sand, fine sand, sand.	SM, SP-SM	A-2	0	100	100	60-90	5-35	---	NP
Mission	0-11	Silt loam	ML, MH	A-5, A-4	0	100	100	95-100	75-90	40-60	NP-5
	11-20	Silt loam, silty clay loam.	CL	A-6	0	100	100	95-100	75-95	25-35	10-15
	20-32	Silt, silt loam, very fine sandy loam.	ML	A-4	0	100	100	95-100	65-95	20-25	NP-5
	32-47	Silt loam, silty clay loam, silty clay.	CL, CL-ML	A-6, A-7, A-4, A-5	0	100	100	95-100	70-95	25-45	5-25
	47-60	Stratified fine sand to silty clay.	CL, ML	A-6, A-4, A-5, A-7	0	100	100	85-95	50-80	15-45	NP-25
51, 52 Treble	0-7	Gravelly sandy loam.	SM	A-1, A-2	0-15	60-80	55-75	35-50	20-30	---	NP
	7-27	Very gravelly sandy loam, very gravelly coarse sandy loam.	GM, GP-GM	A-1	0-20	30-55	25-50	15-35	10-20	---	NP
	27-60	Very gravelly loamy coarse sand, very gravelly coarse sandy loam, very gravelly sandy loam.	GM, GP-GM, SM, SP-SM	A-1	10-25	30-60	25-55	15-35	5-15	---	NP
53, 54 Treble	0-7	Gravelly sandy loam.	SM	A-1, A-2	0-15	60-80	55-75	35-50	20-30	---	NP
	7-27	Very gravelly sandy loam, very gravelly coarse sandy loam.	GM, GP-GM	A-1	0-20	30-55	25-50	15-35	10-20	---	NP
	27-60	Very gravelly loamy coarse sand, very gravelly coarse sandy loam, very gravelly sandy loam.	GM, GP-GM, SM, SP-SM	A-1	10-45	30-60	25-55	15-35	5-15	---	NP
55*:											
Treble	0-7	Gravelly sandy loam.	SM	A-1, A-2	0-15	60-80	55-75	35-50	20-30	---	NP
	7-27	Very gravelly sandy loam, very gravelly coarse sandy loam.	GM, GP-GM	A-1	0-20	30-55	25-50	15-35	10-20	---	NP
	27-60	Very gravelly loamy coarse sand, very gravelly coarse sandy loam, very gravelly sandy loam.	GM, GP-GM, SM, SP-SM	A-1	10-25	30-60	25-55	15-35	5-15	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
55*:											
Rock outcrop.											
56*, 57*:											
Treble	0-7	Gravelly sandy loam.	SM	A-1, A-2	0-15	60-80	55-75	35-50	20-30	---	NP
	7-27	Very gravelly sandy loam, very gravelly coarse sandy loam.	GM, GP-GM	A-1	0-20	30-55	25-50	15-35	10-20	---	NP
	27-60	Very gravelly loamy coarse sand, very gravelly coarse sandy loam, very gravelly sandy loam.	GM, GP-GM, SM, SP-SM	A-1	10-45	30-60	25-55	15-35	5-15	---	NP
Rock outcrop.											
58	0-21	Silt loam	ML, MH	A-5	0	90-100	85-100	75-100	60-90	40-60	NP-5
Vassar	21-39	Coarse sandy loam, sandy loam, gravelly sandy loam.	SM	A-1, A-2	0-10	65-95	60-90	35-65	20-35	---	NP
	39-50	Loamy coarse sand, gravelly loamy coarse sand, cobbly sandy loam.	SM	A-1, A-2	0-25	65-95	60-90	40-70	15-35	---	NP
	50	Weathered bedrock	---	---	---	---	---	---	---	---	---
59*:											
Vassar	0-21	Silt loam	ML, MH	A-5	0	90-100	85-100	75-100	60-90	40-60	NP-5
	21-39	Coarse sandy loam, sandy loam, gravelly sandy loam.	SM	A-1, A-2	0-10	65-95	60-90	35-65	20-35	---	NP
	39-50	Loamy coarse sand, gravelly loamy coarse sand, cobbly sandy loam.	SM	A-1, A-2	0-25	65-95	60-90	40-70	15-35	---	NP
	50	Weathered bedrock	---	---	---	---	---	---	---	---	---
Moscow	0-2	Loam	ML	A-4	0	90-100	90-100	85-95	70-80	---	NP
	2-19	Loam, silt loam	ML, SM	A-4	0	90-100	75-100	55-85	40-70	---	NP
	19-26	Loam, sandy loam, gravelly sandy loam.	ML, SM	A-4, A-2	0-5	80-100	60-90	50-80	30-60	---	NP
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---
60	0-6	Gravelly silt loam.	ML, MH, GM	A-5, A-2	0	55-65	50-60	45-60	30-55	40-60	NP-5
Vay	6-16	Gravelly silt loam, cobbly silt loam.	ML, GM, SM	A-4, A-5, A-2	0-30	55-80	50-75	45-65	30-55	30-50	NP-5
	16-25	Very gravelly loam, very gravelly sandy loam, very cobbly sandy loam.	GM	A-2, A-1	0-35	35-55	30-50	15-45	10-30	---	NP
	25-42	Extremely gravelly coarse sandy loam, very cobbly coarse sandy loam.	GM	A-1	10-50	30-50	25-50	15-30	10-20	---	NP
	42	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
61---------- Vay	0-6	Silt loam--------	ML, MH	A-5	0	85-100	80-100	70-100	65-90	40-60	NP-5
	6-16	Gravelly silt loam, silt loam, cobbly silt loam.	ML, GM, SM	A-2, A-4, A-5	0-30	55-85	50-80	45-75	35-65	30-50	NP-5
	16-25	Very cobbly loam, very gravelly loam, very gravelly sandy loam.	GM	A-1, A-2	10-45	35-55	30-50	25-45	15-35	---	NP
	25-60	Extremely gravelly coarse sandy loam, very gravelly sandy loam, very cobbly coarse sandy loam.	GM	A-1	10-55	35-60	30-55	20-35	10-20	---	NP
62*, 63*: Vay----------	0-6	Silt loam--------	ML, MH	A-5	0	80-100	75-100	70-100	60-90	40-60	NP-5
	6-16	Gravelly silt loam, cobbly silt loam.	ML, GM, SM	A-4, A-5, A-2	0-30	55-80	50-75	45-65	30-55	30-50	NP-5
	16-25	Very gravelly loam, very gravelly sandy loam, very cobbly sandy loam.	GM	A-2, A-1	0-35	35-55	30-50	15-45	10-30	---	NP
	25-42	Extremely gravelly coarse sandy loam, very cobbly coarse sandy loam.	GM	A-1	10-50	30-50	25-50	15-30	10-20	---	NP
	42	Weathered bedrock	---	---	---	---	---	---	---	---	---
Ardtoo----------	0-6	Gravelly loam----	GM, SM	A-4	0	65-80	60-75	50-65	35-50	---	NP
	6-12	Gravelly loam, very gravelly loam.	GM, SM	A-2, A-4	0-10	50-75	45-70	30-60	25-40	---	NP
	12-45	Very gravelly coarse sandy loam, very cobbly sandy loam, extremely cobbly sandy loam.	SM, GM	A-1, A-2, A-3	0-40	45-75	40-70	20-55	10-35	---	NP
	45	Weathered bedrock	---	---	---	---	---	---	---	---	---
64---------- Wrencoe	0-10	Silty clay-------	CL	A-6, A-7	0	100	100	95-100	90-95	30-50	10-30
	10-50	Silty clay-------	CL, CH	A-7	0	100	100	95-100	90-95	40-55	15-30
	50-60	Silty clay loam, silty clay, gravelly silty clay loam.	CL	A-6, A-7	0-20	75-100	70-100	65-95	60-90	30-50	10-30

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	G/cm^3	In/hr	In/in	pH					Pct
1----------	0-12	4-10	1.30-1.50	2.0-6.0	0.07-0.09	5.6-7.3	Low----------	0.20	3	---	2-4
Ardtoo	12-45	2-10	1.30-1.60	2.0-6.0	0.04-0.09	5.6-7.3	Low----------	0.15			
	45	---	---	---	---	---	----------	----			
2, 3----------	0-5	2-8	0.70-0.95	0.6-2.0	0.14-0.16	5.6-7.3	Low----------	0.28	3	5	2-4
Bonner	5-21	2-8	0.85-1.20	0.6-2.0	0.14-0.20	5.6-7.3	Low----------	0.28			
	21-29	2-8	1.35-1.55	0.6-2.0	0.08-0.12	5.6-7.3	Low----------	0.24			
	29-60	0-5	1.30-1.55	>6.0	0.03-0.05	5.6-7.3	Low----------	0.02			
4----------	0-5	2-8	0.70-0.95	0.6-2.0	0.17-0.21	5.6-7.3	Low----------	0.49	3	5	2-4
Bonner	5-21	2-8	0.85-1.20	0.6-2.0	0.14-0.20	5.6-7.3	Low----------	0.28			
	21-29	2-8	1.35-1.55	0.6-2.0	0.08-0.12	5.6-7.3	Low----------	0.24			
	29-60	0-5	1.30-1.55	>6.0	0.03-0.05	5.6-7.3	Low----------	0.02			
5*:											
Brickel---------	0-7	8-18	1.30-1.50	0.6-2.0	0.12-0.14	5.6-6.5	Low----------	0.28	2	---	4-6
	7-15	8-12	1.30-1.50	0.6-2.0	0.06-0.08	5.6-6.5	Low----------	0.28			
	15-27	4-12	1.45-1.60	0.6-6.0	0.06-0.09	5.6-6.5	Low----------	0.28			
	27	---	---	---	---	---	----------	----			
Rubble land.											
6, 7----------	0-11	6-12	0.80-1.20	0.6-2.0	0.19-0.21	5.6-7.3	Low----------	0.43	2	5	4-6
Cabinet	11-19	27-35	1.55-1.70	0.06-0.6	0.19-0.21	5.1-6.0	Low----------	0.55			
	19-35	50-70	1.60-1.70	<0.06	0.14-0.17	4.5-6.0	Moderate-----	0.37			
	35-60	15-45	1.40-1.70	0.06-6.0	0.14-0.17	4.5-6.0	Moderate-----	0.37			
8----------	0-7	5-10	0.65-0.85	0.6-2.0	0.19-0.21	5.1-6.0	Low----------	0.49	2	5	2-4
Capehorn	7-15	5-10	0.65-0.95	0.6-2.0	0.14-0.19	5.1-6.0	Low----------	0.37			
	15-60	0-5	1.40-1.60	>20.0	0.03-0.05	5.6-7.3	Low----------	0.05			
9----------	0-3	3-10	0.85-1.00	0.6-2.0	0.15-0.17	5.6-7.3	Low----------	0.43	3	3	2-4
Colburn	3-24	3-10	1.00-1.40	0.6-6.0	0.13-0.19	5.6-7.3	Low----------	0.43			
	24-60	0-4	1.30-1.50	2.0-20	0.06-0.11	5.6-7.3	Low----------	0.28			
10----------	0-13	4-8	0.70-0.85	0.6-2.0	0.19-0.21	5.6-7.3	Low----------	0.43	3	---	1-3
Dufort	13-24	4-10	1.00-1.35	0.6-2.0	0.14-0.16	5.6-7.3	Low----------	0.24			
	24-60	3-8	1.35-1.60	2.0-6.0	0.04-0.06	5.6-7.3	Low----------	0.05			
11*:											
Dufort----------	0-13	4-8	0.70-0.85	0.6-2.0	0.19-0.21	5.6-7.3	Low----------	0.43	3	---	1-3
	13-24	4-10	1.00-1.35	0.6-2.0	0.14-0.16	5.6-7.3	Low----------	0.24			
	24-60	3-8	1.35-1.60	2.0-6.0	0.04-0.06	5.6-7.3	Low----------	0.05			
Rock outcrop.											
12----------	0-4	0-4	1.05-1.30	6.0-20	0.06-0.11	5.6-7.3	Low----------	0.20	5	2	1-3
Elmira	4-60	0-4	1.30-1.50	6.0-20	0.04-0.10	5.6-7.3	Low----------	0.10			
13----------	0-8	0-4	1.30-1.50	6.0-20.0	0.06-0.08	4.5-6.0	Low----------	0.17	1	2	1-2
Elmira Variant	8-60	0-4	1.40-1.60	>20.0	0.04-0.06	5.6-6.5	Low----------	0.10			
14*:											
Haploxeralfs.											
Xerochrepts.											
15----------	0-15	0-5	0.65-0.85	0.6-2.0	0.19-0.21	5.6-7.3	Low----------	0.49	4	---	2-5
Hoodoo	15-52	0-5	0.75-1.00	0.6-2.0	0.15-0.20	5.6-7.3	Low----------	0.49			
	52-60	20-35	1.50-1.70	0.2-0.6	0.10-0.15	5.6-7.3	Moderate-----	0.07			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	G/cm³	In/hr	In/in	pH					Pct
16----------	0-9	3-6	0.60-0.95	0.6-2.0	0.14-0.16	5.1-6.5	Low----------	0.28	3	---	2-4
Hun	9-25	3-6	1.00-1.35	2.0-6.0	0.04-0.06	5.1-6.5	Low----------	0.10			
	25-55	0-5	1.40-1.60	>6.0	0.03-0.05	5.1-6.5	Low----------	0.05			
	55	---	---	---	---	---	----------	----			
17----------	0-6	7-10	1.30-1.50	0.6-2.0	0.13-0.15	5.6-7.3	Low----------	0.20	3	---	3-4
Jeru	6-23	4-10	1.30-1.50	2.0-6.0	0.06-0.13	5.6-7.3	Low----------	0.15			
	23-32	2-6	1.30-1.50	2.0-6.0	0.04-0.06	5.6-7.3	Low----------	0.10			
	32-60	0-5	1.30-1.50	2.0-20.0	0.03-0.05	5.6-7.3	Low----------	0.05			
18, 19----------	0-6	4-10	1.30-1.50	2.0-6.0	0.07-0.09	5.6-7.3	Low----------	0.17	3	---	3-4
Jeru	6-23	4-10	1.30-1.50	2.0-6.0	0.04-0.09	5.6-7.3	Low----------	0.15			
	23-32	2-6	1.30-1.50	2.0-6.0	0.04-0.06	5.6-7.3	Low----------	0.10			
	32-60	0-5	1.30-1.50	2.0-20.0	0.03-0.05	5.6-7.3	Low----------	0.05			
20----------	0-7	4-7	1.30-1.50	2.0-6.0	0.11-0.15	5.6-7.3	Low----------	0.32	4	3	1-3
Kaniksu	7-19	4-7	1.30-1.60	2.0-6.0	0.11-0.15	5.6-7.3	Low----------	0.37			
	19-26	0-3	1.30-1.60	6.0-20.0	0.05-0.08	5.6-7.3	Low----------	0.17			
	26-60	0-3	1.30-1.60	6.0-20.0	0.04-0.08	5.6-7.3	Low----------	0.10			
21, 22----------	0-5	4-8	1.00-1.30	2.0-6.0	0.07-0.09	5.6-7.3	Low----------	0.15	2	---	1-3
Klootch	5-26	3-8	1.00-1.30	2.0-6.0	0.05-0.10	5.6-7.3	Low----------	0.10			
	26	---	---	---	---	---	----------	----			
23, 24----------	0-5	3-10	0.70-0.95	0.6-2.0	0.15-0.17	5.6-7.3	Low----------	0.28	2	5	3-6
Kootenai	5-22	3-10	1.10-1.50	0.6-2.0	0.09-0.16	5.6-7.3	Low----------	0.28			
	22-26	3-10	1.30-1.55	0.6-6.0	0.05-0.09	5.6-7.3	Low----------	0.10			
	26-60	0-5	1.40-1.65	>20	0.03-0.05	5.6-7.3	Low----------	0.02			
25*:											
Kootenai--------	0-5	3-10	0.70-0.95	0.6-2.0	0.15-0.17	5.6-7.3	Low----------	0.28	2	5	3-6
	5-22	3-10	1.10-1.50	0.6-2.0	0.09-0.16	5.6-7.3	Low----------	0.28			
	22-26	3-10	1.30-1.55	0.6-6.0	0.05-0.09	5.6-7.3	Low----------	0.10			
	26-60	0-5	1.40-1.65	>20	0.03-0.05	5.6-7.3	Low----------	0.02			
Bonner----------	0-5	2-8	0.70-0.95	0.6-2.0	0.14-0.16	5.6-7.3	Low----------	0.28	3	5	2-4
	5-21	2-8	0.85-1.20	0.6-2.0	0.14-0.20	5.6-7.3	Low----------	0.28			
	21-29	2-8	1.35-1.55	0.6-2.0	0.08-0.12	5.6-7.3	Low----------	0.24			
	29-60	0-5	1.30-1.55	>6.0	0.03-0.05	5.6-7.3	Low----------	0.02			
26----------	0-15	10-18	1.20-1.45	0.6-2.0	0.19-0.21	5.6-7.3	Low----------	0.49	5	5	1-3
Kruse	15-51	20-35	1.35-1.60	0.2-0.6	0.19-0.21	5.6-6.5	Moderate-----	0.37			
	51-60	15-30	1.40-1.60	0.2-6.0	0.10-0.16	5.6-6.5	Low----------	0.28			
27----------	0-10	5-10	0.70-0.95	0.6-2.0	0.17-0.21	5.1-6.0	Low----------	0.43	2	---	2-4
Kruse Variant	10-28	5-15	1.45-1.55	0.6-6.0	0.06-0.11	5.1-6.0	Low----------	0.15			
	28-38	20-25	1.55-1.65	0.6-2.0	0.10-0.12	5.1-6.0	Low----------	0.15			
	38	---	---	---	---	---	----------	----			
28*:											
Lenz----------	0-7	5-10	1.30-1.50	2.0-6.0	0.07-0.09	5.6-6.5	Low----------	0.17	2	---	1-3
	7-24	5-10	1.30-1.50	2.0-6.0	0.04-0.06	5.6-6.5	Low----------	0.05			
	24	---	---	---	---	---	----------	----			
Rock outcrop.											
29, 30----------	0-9	8-10	1.30-1.50	0.6-2.0	0.16-0.18	5.6-7.3	Low----------	0.37	5	---	1-3
Melder	9-33	10-30	1.45-1.60	0.2-0.6	0.09-0.15	5.6-7.3	Moderate-----	0.20			
	33-60	8-20	1.50-1.65	2.0-6.0	0.04-0.06	5.6-7.3	Low----------	0.10			
31, 32, 33-------	0-11	3-8	0.60-0.85	0.6-2.0	0.18-0.20	5.6-7.3	Low----------	0.55	2	5	3-6
Mission	11-20	12-30	1.70-1.80	<0.06	0.07-0.10	5.6-7.3	Moderate-----	0.55			
	20-32	2-10	1.50-1.65	0.2-0.6	0.17-0.20	5.6-6.5	Low----------	0.64			
	32-47	15-45	1.50-1.70	<0.06	0.08-0.12	5.1-7.3	Moderate-----	0.55			
	47-60	0-45	1.30-1.70	0.06-0.2	0.10-0.14	5.1-7.8	Moderate-----	0.32			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	G/cm³	In/hr	In/in	pH					Pct
34----------	0-9	4-10	1.20-1.30	0.6-2.0	0.19-0.21	6.1-7.8	Low----------	0.43	5	5	3-6
Odenson	9-35	18-35	1.50-1.65	0.2-0.6	0.19-0.21	7.4-8.4	Moderate-----	0.49			
	35-60	4-42	1.40-1.70	0.06-0.2	0.15-0.21	7.9-8.4	Moderate-----	0.55			
35----------	0-13	3-5	0.65-0.95	0.6-2.0	0.19-0.21	5.6-7.3	Low----------	0.43	4	---	1-3
Pend Oreille	13-17	2-8	0.85-1.20	0.6-2.0	0.17-0.20	5.6-7.3	Low----------	0.43			
	17-41	2-5	1.30-1.50	2.0-6.0	0.07-0.09	5.6-7.3	Low----------	0.24			
	41-60	2-5	1.30-1.50	2.0-6.0	0.04-0.07	5.6-7.3	Low----------	0.15			
36*:											
Pend Oreille----	0-13	3-5	0.65-0.95	0.6-2.0	0.19-0.21	5.6-7.3	Low----------	0.43	4	---	1-3
	13-17	2-8	0.85-1.20	0.6-2.0	0.17-0.20	5.6-7.3	Low----------	0.43			
	17-41	2-5	1.30-1.50	2.0-6.0	0.07-0.09	5.6-7.3	Low----------	0.24			
	41-60	2-5	1.30-1.50	2.0-6.0	0.04-0.07	5.6-7.3	Low----------	0.15			
Hoodoo----------	0-15	0-5	0.65-0.85	0.6-2.0	0.19-0.21	5.6-7.3	Low----------	0.49	4	---	2-5
	15-52	0-5	0.75-1.00	0.6-2.0	0.15-0.20	5.6-7.3	Low----------	0.49			
	52-60	20-35	1.50-1.70	0.2-0.6	0.10-0.15	5.6-7.3	Moderate-----	0.07			
37*:											
Pend Oreille----	0-13	3-5	0.65-0.95	0.6-2.0	0.19-0.21	5.6-7.3	Low----------	0.43	4	---	1-3
	13-17	2-8	0.85-1.20	0.6-2.0	0.17-0.20	5.6-7.3	Low----------	0.43			
	17-41	2-5	1.30-1.50	2.0-6.0	0.07-0.09	5.6-7.3	Low----------	0.24			
	41-60	2-5	1.30-1.50	2.0-6.0	0.04-0.07	5.6-7.3	Low----------	0.15			
Rock outcrop.											
38, 39----------	0-12	3-8	1.20-1.35	2.0-6.0	0.07-0.09	5.6-7.3	Low----------	0.17	2	---	1-2
Priestlake	12-23	3-8	1.30-1.55	2.0-6.0	0.04-0.06	5.6-7.3	Low----------	0.10			
	23-60	3-8	1.55-1.70	>6.0	0.03-0.05	5.6-7.3	Low----------	0.05			
40----------	0-18	7-10	0.85-0.95	0.6-2.0	0.13-0.15	5.1-6.0	Low----------	0.28	2	---	2-4
Prouty	18-37	2-5	1.30-1.60	2.0-6.0	0.03-0.06	5.1-6.0	Low----------	0.24			
	37	---	---	---	---	---	----------	----			
41----------	0-10	---	0.20-0.40	0.6-2.0	0.22-0.30	5.1-7.3	High---------	----	5	2	20-65
Pywell	10-60	---	0.20-0.40	0.6-2.0	0.22-0.30	5.1-7.3	High---------	----			
42*:											
Pywell----------	0-10	---	0.20-0.40	0.6-2.0	0.22-0.30	5.1-7.3	High---------	----	5	2	20-65
	10-60	---	0.20-0.40	0.6-2.0	0.22-0.30	5.1-7.3	High---------	----			
Hoodoo----------	0-15	0-5	0.65-0.85	0.6-2.0	0.19-0.21	5.6-7.3	Low----------	0.49	4	---	2-5
	15-52	0-5	0.75-1.00	0.6-2.0	0.15-0.20	5.6-7.3	Low----------	0.49			
	52-60	20-35	1.50-1.70	0.2-0.6	0.10-0.15	5.6-7.3	Moderate-----	0.07			
43----------	0-17	---	0.65-0.85	0.6-2.0	0.19-0.21	5.6-7.3	Low----------	0.55	5	5	3-6
Rathdrum	17-55	---	0.65-0.85	0.6-2.0	0.15-0.21	5.6-7.3	Low----------	0.55			
	55-60	---	0.65-0.95	0.6-2.0	0.11-0.21	5.6-7.3	Low----------	0.49			
44----------	0-17	---	0.65-0.85	0.6-2.0	0.19-0.21	5.6-7.3	Low----------	0.55	5	5	3-6
Rathdrum	17-55	---	0.65-0.85	0.6-2.0	0.15-0.21	5.6-7.3	Low----------	0.55			
	55-60	---	0.65-0.95	0.6-2.0	0.11-0.21	5.6-7.3	Low----------	0.49			
45*:											
Rathdrum--------	0-17	---	0.65-0.85	0.6-2.0	0.19-0.21	5.6-7.3	Low----------	0.55	5	5	3-6
	17-55	---	0.65-0.85	0.6-2.0	0.15-0.21	5.6-7.3	Low----------	0.55			
	55-60	---	0.65-0.95	0.6-2.0	0.11-0.21	5.6-7.3	Low----------	0.49			
Bonner----------	0-5	2-8	0.70-0.95	0.6-2.0	0.17-0.21	5.6-7.3	Low----------	0.49	3	5	2-4
	5-21	2-8	0.85-1.20	0.6-2.0	0.14-0.20	5.6-7.3	Low----------	0.28			
	21-29	2-8	1.35-1.55	0.6-2.0	0.08-0.12	5.6-7.3	Low----------	0.24			
	29-60	0-5	1.30-1.55	>6.0	0.03-0.05	5.6-7.3	Low----------	0.02			
46*:											
Rock outcrop.											

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	G/cm³	In/hr	In/in	pH					Pct
46*:											
Rubble land.											
47----------	0-15	4-8	0.65-0.95	0.6-2.0	0.19-0.21	5.6-7.3	Low----------	0.43	3	5	1-3
Sagle	15-21	4-8	0.95-1.25	0.6-2.0	0.12-0.15	5.6-6.5	Low----------	0.20			
	21-60	0-4	1.35-1.65	2.0-6.0	0.04-0.06	5.1-6.0	Low----------	0.10			
48----------	0-20	2-4	1.00-1.30	2.0-6.0	0.13-0.15	5.6-7.3	Low----------	0.28	5	3	1-3
Selle	20-60	2-4	1.30-1.50	6.0-20.0	0.05-0.10	5.6-7.3	Low----------	0.20			
49*:											
Selle----------	0-20	2-4	1.00-1.30	2.0-6.0	0.13-0.15	5.6-7.3	Low----------	0.28	5	3	1-3
	20-60	2-4	1.30-1.50	6.0-20.0	0.05-0.10	5.6-7.3	Low----------	0.20			
Elmira----------	0-4	0-4	1.05-1.30	6.0-20	0.06-0.11	5.6-7.3	Low----------	0.20	5	2	1-3
	4-60	0-4	1.30-1.50	6.0-20	0.04-0.10	5.6-7.3	Low----------	0.10			
50*:											
Selle----------	0-20	2-4	1.00-1.30	2.0-6.0	0.13-0.15	5.6-7.3	Low----------	0.28	5	3	1-3
	20-60	2-4	1.30-1.50	6.0-20.0	0.05-0.10	5.6-7.3	Low----------	0.20			
Mission---------	0-11	3-8	0.60-0.85	0.6-2.0	0.18-0.20	5.6-7.3	Low----------	0.55	2	5	3-6
	11-20	12-30	1.70-1.80	<0.06	0.07-0.10	5.6-7.3	Moderate-----	0.55			
	20-32	2-10	1.50-1.65	0.2-0.6	0.17-0.20	5.6-6.5	Low----------	0.64			
	32-47	15-45	1.50-1.70	<0.06	0.08-0.12	5.1-7.3	Moderate-----	0.55			
	47-60	0-45	1.30-1.70	0.06-0.2	0.10-0.14	5.1-7.8	Moderate-----	0.32			
51, 52, 53, 54---	0-7	3-10	1.30-1.50	2.0-6.0	0.07-0.09	5.6-7.3	Low----------	0.17	3	---	.5-2
Treble	7-27	3-10	1.50-1.70	2.0-6.0	0.04-0.06	5.6-6.5	Low----------	0.10			
	27-60	0-5	1.50-1.70	2.0-20.0	0.03-0.06	5.6-6.5	Low----------	0.05			
55*, 56*, 57*:											
Treble----------	0-7	3-10	1.30-1.50	2.0-6.0	0.07-0.09	5.6-7.3	Low----------	0.17	3	---	.5-2
	7-27	3-10	1.50-1.70	2.0-6.0	0.04-0.06	5.6-6.5	Low----------	0.10			
	27-60	0-5	1.50-1.70	2.0-20.0	0.03-0.06	5.6-6.5	Low----------	0.05			
Rock outcrop.											
58----------	0-21	4-8	0.65-0.85	0.6-2.0	0.19-0.21	5.6-7.3	Low----------	0.49	3	---	2-4
Vassar	21-39	2-4	1.30-1.50	2.0-6.0	0.07-0.13	5.6-7.3	Low----------	0.28			
	39-50	2-4	1.30-1.60	6.0-20.0	0.04-0.09	5.6-7.3	Low----------	0.10			
	50	---	---	---	---	---	----------	----			
59*:											
Vassar----------	0-21	4-8	0.65-0.85	0.6-2.0	0.19-0.21	5.6-7.3	Low----------	0.49	3	---	2-4
	21-39	2-4	1.30-1.50	2.0-6.0	0.07-0.13	5.6-7.3	Low----------	0.28			
	39-50	2-4	1.30-1.60	6.0-20.0	0.04-0.09	5.6-7.3	Low----------	0.10			
	50	---	---	---	---	---	----------	----			
Moscow----------	0-2	---	0.65-0.95	0.6-2.0	0.16-0.20	5.1-7.3	Low----------	0.43	3	5	1-3
	2-19	---	0.85-0.95	0.6-2.0	0.16-0.20	5.1-7.3	Low----------	0.43			
	19-26	5-10	1.30-1.50	0.6-6.0	0.12-0.16	5.1-7.3	Low----------	0.37			
	26	---	---	---	---	---	----------	----			
60----------	0-6	4-8	0.65-0.85	0.6-2.0	0.14-0.16	5.6-7.3	Low----------	0.28	3	---	2-4
Vay	6-16	4-8	0.65-0.85	0.6-2.0	0.14-0.16	5.6-7.3	Low----------	0.24			
	16-25	4-8	1.20-1.45	2.0-6.0	0.06-0.12	5.6-7.3	Low----------	0.15			
	25-42	2-5	1.40-1.55	2.0-6.0	0.03-0.06	5.6-7.3	Low----------	0.10			
	42	---	---	---	---	---	----------	----			
61----------	0-6	4-8	0.70-0.85	0.6-2.0	0.19-0.21	5.6-7.3	Low----------	0.49	3	---	4-6
Vay	6-16	4-8	0.70-0.85	0.6-2.0	0.14-0.21	5.6-7.3	Low----------	0.32			
	16-25	4-8	0.95-1.40	0.6-6.0	0.06-0.08	5.6-7.3	Low----------	0.15			
	25-60	2-5	1.30-1.50	2.0-6.0	0.04-0.06	5.6-7.3	Low----------	0.10			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	G/cm^3	In/hr	In/in	pH					Pct
62*, 63*:											
Vay	0-6	4-8	0.65-0.85	0.6-2.0	0.19-0.21	5.6-7.3	Low	0.49	3	---	2-4
	6-16	4-8	0.65-0.85	0.6-2.0	0.14-0.16	5.6-7.3	Low	0.32			
	16-25	4-8	1.20-1.45	2.0-6.0	0.06-0.12	5.6-7.3	Low	0.15			
	25-42	2-5	1.40-1.55	2.0-6.0	0.03-0.06	5.6-7.3	Low	0.10			
	42	---	---	---	---	---	---	---			
Ardtoo	0-6	7-10	1.30-1.45	0.6-2.0	0.13-0.15	5.6-7.3	Low	0.24	3	---	2-4
	6-12	7-10	1.30-1.50	0.6-2.0	0.06-0.13	5.6-7.3	Low	0.20			
	12-45	2-10	1.30-1.60	2.0-6.0	0.04-0.09	5.6-7.3	Low	0.15			
	45	---	---	---	---	---	---	---			
64	0-10	35-50	1.45-1.65	0.06-0.6	0.16-0.21	6.1-7.3	Moderate	0.28	5	---	2-5
Wrencoe	10-50	40-55	1.50-1.65	0.06-0.2	0.16-0.17	6.1-7.8	Moderate	0.32			
	50-60	35-50	1.45-1.65	0.06-0.6	0.14-0.21	6.6-7.8	Moderate	0.32			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
1---------- Ardtoo	B	None---------	---	---	>6.0	---	---	>40	Soft	Moderate	Moderate	Moderate.
2, 3, 4---------- Bonner	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
5*: Brickel----------	C	None---------	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Moderate.
Rubble land.												
6, 7---------- Cabinet	C	None---------	---	---	0.5-2.0	Perched	Feb-Apr	>60	---	High-----	High-----	Moderate.
8---------- Capehorn	D	Frequent-----	Long------	Jan-May	0-1.5	Apparent	Jan-Jun	>60	---	High-----	High-----	Moderate.
9---------- Colburn	C	Rare---------	---	---	2.0-3.0	Apparent	Feb-May	>60	---	High-----	Moderate	Moderate.
10---------- Dufort	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
11*: Dufort----------	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
Rock outcrop.												
12---------- Elmira	A	None---------	---	---	>6.0	---	---	>60	---	Low------	Moderate	Moderate.
13---------- Elmira Variant	D	Rare---------	---	---	1.0-2.0	Apparent	Feb-Jun	>60	---	Moderate	High-----	Moderate.
14*: Haploxeralfs.												
Xerochrepts.												
15---------- Hoodoo	D	Frequent-----	Very long	Feb-Jun	1.0-2.0	Apparent	Feb-Jun	>60	---	High-----	High-----	Moderate.
16---------- Hun	B	None---------	---	---	>6.0	---	---	>40	Soft	Moderate	Moderate	Moderate.
17, 18, 19-------- Jeru	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
20---------- Kaniksu	B	None---------	---	---	>6.0	---	---	>60	---	Low------	Moderate	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
21, 22---------- Klootch	C	None---------	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Moderate.
23, 24---------- Kootenai	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
25*: Kootenai---------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Bonner----------	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
26---------- Kruse	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
27---------- Kruse Variant	B	None---------	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	Moderate.
28*: Lenz----------	C	None---------	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Moderate.
Rock outcrop.												
29, 30---------- Melder	B	None---------	---	---	>6.0	---	---	>40	Soft	Moderate	Moderate	Moderate.
31, 32, 33-------- Mission	D	None---------	---	---	0.5-1.5	Perched	Feb-May	>60	---	High-----	High-----	Moderate.
34---------- Odenson	D	None---------	---	---	0.5-2.0	Apparent	Feb-Jun	>60	---	High-----	High-----	Low.
35---------- Pend Oreille	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
36*: Pend Oreille-----	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
Hoodoo----------	D	Frequent----	Very long	Feb-Jun	1.0-2.0	Apparent	Feb-Jun	>60	---	High-----	High-----	Moderate.
37*: Pend Oreille-----	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
Rock outcrop.												
38, 39---------- Priestlake	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
40---------- Prouty	B	None---------	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	Moderate.
41---------- Pywell	D	Frequent----	Very long	Dec-Jun	0-4.0	Apparent	Jan-Dec	>60	---	High-----	High-----	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
42*:												
Pywell	D	Frequent	Very long	Dec-Jun	0-4.0	Apparent	Jan-Dec	>60	---	High	High	Moderate.
Hoodoo	D	Frequent	Very long	Feb-Jun	1.0-2.0	Apparent	Feb-Jun	>60	---	High	High	Moderate.
43, 44 Rathdrum	B	None	---	---	>6.0	---	---	>60	---	High	Moderate	Moderate.
45*:												
Rathdrum	B	None	---	---	>6.0	---	---	>60	---	High	Moderate	Moderate.
Bonner	B	None	---	---	>6.0	---	---	>60	---	High	Moderate	Moderate.
46*:												
Rock outcrop.												
Rubble land.												
47 Sagle	C	None	---	---	2.0-3.5	Apparent	Feb-Jun	>60	---	High	High	Moderate.
48 Selle	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
49*:												
Selle	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Elmira	A	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Moderate.
50*:												
Selle	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Mission	D	None	---	---	0.5-1.5	Perched	Feb-May	>60	---	High	High	Moderate.
51, 52, 53, 54 Treble	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
55*, 56*, 57*:												
Treble	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Rock outcrop.												
58 Vassar	B	None	---	---	>6.0	---	---	>40	Soft	High	Moderate	Moderate.
59*:												
Vassar	B	None	---	---	>6.0	---	---	>40	Soft	High	Moderate	Moderate.
Moscow	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	Moderate.
60, 61 Vay	B	None	---	---	>6.0	---	---	>40	Soft	High	Moderate	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
62*, 63*:												
Vay	B	None	---	---	>6.0	---	---	>40	Soft	High	Moderate	Moderate.
Ardtoo	B	None	---	---	>6.0	---	---	>40	Soft	Moderate	Moderate	Moderate.
64 Wrencoe	D	Frequent	Very long	Dec-Jun	0-1.5	Apparent	Dec-Jun	>60	---	High	High	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series]

Soil name	Family or higher taxonomic class
Ardtoo	Loamy-skeletal, mixed, frigid Dystric Xerochrepts
Bonner	Coarse-loamy over sandy or sandy-skeletal, mixed, frigid Andic Xerochrepts
Brickel	Loamy-skeletal, mixed Typic Cryoborolls
Cabinet	Clayey over loamy, mixed, frigid Aquultic Haploxeralfs
Capehorn	Medial over sandy or sandy-skeletal, mixed, nonacid Aeric Cryaquepts
Colburn	Coarse-loamy over sandy or sandy-skeletal, mixed, frigid Aquic Xerochrepts
Dufort	Medial over loamy-skeletal, mixed, frigid Andic Xerochrepts
Elmira	Mixed, frigid Alfic Xeropsamments
Elmira Variant	Siliceous, frigid Aquic Xeropsamments
Hoodoo	Medial, nonacid, frigid Mollic Andaquepts
Hun	Loamy-skeletal, mixed Andic Cryochrepts
Jeru	Loamy-skeletal, mixed Dystric Cryochrepts
Kaniksu	Sandy mixed, frigid Typic Xerochrepts
Klootch	Loamy-skeletal, mixed Dystric Cryochrepts
Kootenai	Coarse-loamy over sandy or sandy-skeletal, mixed, frigid Typic Xerochrepts
Kruse	Fine-loamy, mixed, frigid Ultic Haploxeralfs
Kruse Variant	Fine-loamy, mixed Typic Paleboralfs
Lenz	Loamy-skeletal, mixed, mesic Ultic Haploxerolls
Melder	Loamy-skeletal, mixed, mesic Mollic Haploxeralfs
Mission	Medial, frigid Ochreptic Fragixeralfs
Moscow	Coarse-loamy, mixed, frigid Andic Xerochrepts
Odenson	Fine-silty, mixed, frigid Andaqueptic Haplaquolls
Pend Oreille	Medial over loamy, mixed, frigid Andic Xerochrepts
Priestlake	Sandy-skeletal, mixed Dystric Cryochrepts
Prouty	Loamy-skeletal, mixed Andic Cryochrepts
*Pywell	Euic Typic Borosaprists
Rathdrum	Ashy, frigid Typic Vitrandepts
Sagle	Medial over loamy-skeletal, mixed, frigid Aquic Dystric Xerochrepts
Selle	Sandy, mixed, frigid Dystric Xerochrepts
Treble	Loamy-skeletal, mixed, frigid Dystric Xerochrepts
Vassar	Medial over loamy, mixed Entic Cryandepts
Vay	Medial over loamy-skeletal, mixed Entic Cryandepts
Wrencoe	Fine, mixed, frigid Typic Haplaquolls

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MAP UNITS

MODERATELY STEEP TO VERY STEEP, WELL DRAINED SOILS ON MOUNTAINS

1 Rock outcrop-Prouty-Jeru: Rock outcrop and moderately deep and very deep, steep and very steep, moderately permeable soils; on mountains at high elevations

2 Vay-Ardtoo-Lenz: Moderately deep to very deep, moderately steep to very steep, moderately permeable and moderately rapidly permeable soils; on mountains

3 Hun-Jeru: Deep and very deep, rolling to very steep, moderately rapidly permeable soils; on mountains

4 Melder-Kruse: Deep and very deep, moderately steep to very steep, moderately slowly permeable soils; on mountains

5 Vassar-Moscow: Moderately deep to very deep, steep and very steep, moderately permeable soils; on mountains

ROLLING TO VERY STEEP, WELL DRAINED SOILS ON FOOTHILLS AND MOUNTAINS

6 Pend Oreille-Rock outcrop-Treble: Very deep, well drained, rolling to very steep soils, and Rock outcrop; on foothills and mountainsides

7 Priestlake-Treble: Very deep, well drained, moderately steep to very steep soils; on foothills and mountainsides

LEVEL TO HILLY, WELL DRAINED SOILS ON GLACIAL MORAINES AND TERRACES

8 Bonner-Kootenai: Very deep, well drained, level to hilly soils; on terraces

9 Bonner: Very deep, level to undulating, well drained soils; on terraces

LEVEL TO HILLY, POORLY DRAINED TO EXCESSIVELY DRAINED SOILS ON ALLUVIAL FANS, TERRACES, AND DUNES

10 Colburn-Selle-Elmira: Very deep, level to hilly, somewhat poorly drained to excessively drained soils; on alluvial fans, terraces, and dunes

11 Mission-Cabinet-Odenson: Very deep, level to moderately steep, poorly drained to moderately well drained soils; on terraces

LEVEL AND NEARLY LEVEL, POORLY DRAINED AND VERY POORLY DRAINED SOILS ON LOW STREAM TERRACES, FLOOD PLAINS, AND BOTTOM LANDS

12 Hoodoo-Pywell-Wrencoe: Very deep, level and nearly level, poorly drained and very poorly drained soils; on low stream terraces, flood plains, and bottom lands

Compiled 1982

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
UNIVERSITY OF IDAHO, COLLEGE OF AGRICULTURE
IDAHO SOIL CONSERVATION COMMISSION

GENERAL SOIL MAP

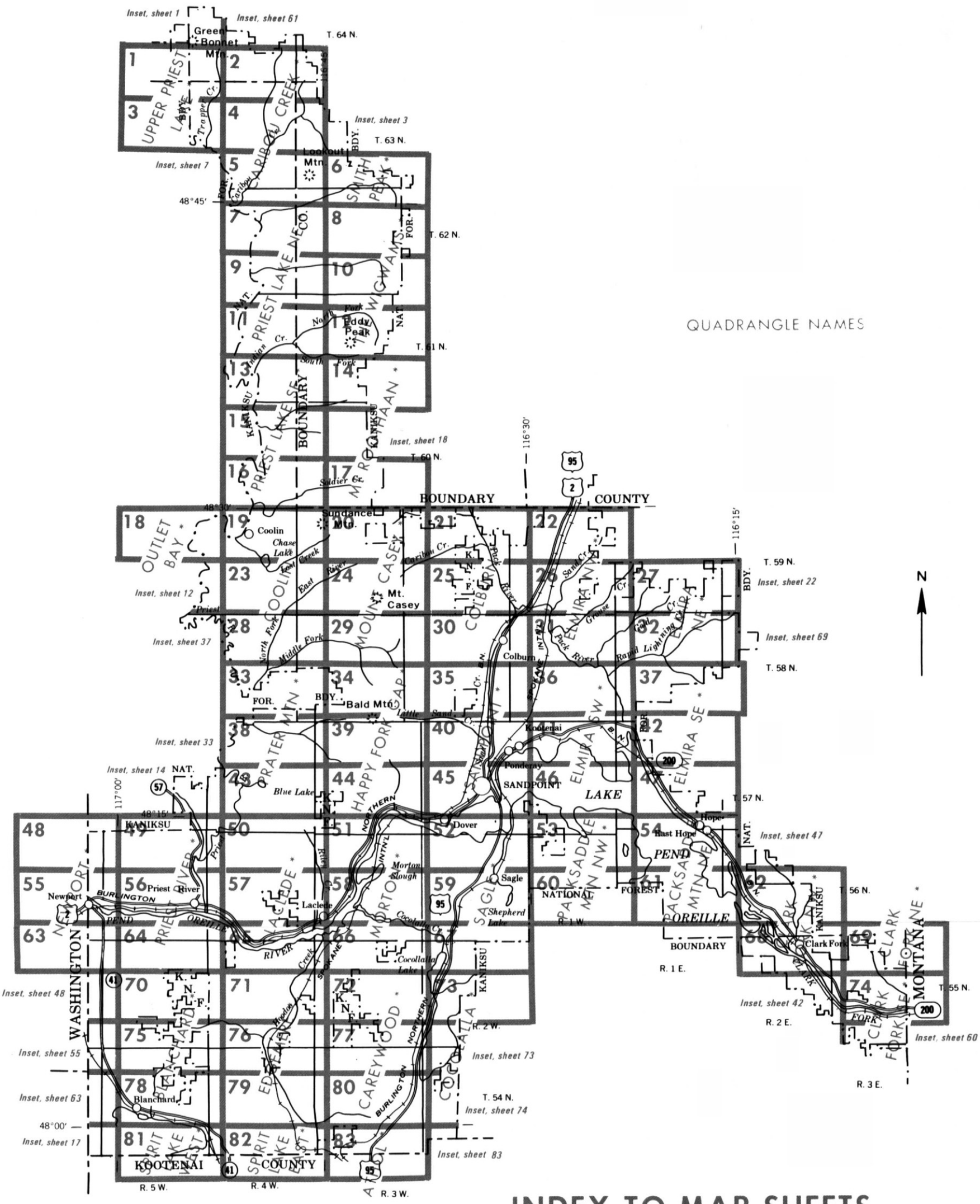
BONNER COUNTY AREA, IDAHO
PARTS OF BONNER AND BOUNDARY COUNTIES

SCALE 1:380,160

3 0 3 6

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

Original text from each individual map sheet read:
Coordinate grid ticks and land division corners, if shown,
are approximately positioned. Base maps are orthophotographs
prepared by the U.S. Department of the Interior,
Geological Survey, from 1975 and 1976 aerial photography.
This soil survey map was compiled by the U.S. Department of
Agriculture, Soil Conservation Service, and cooperating agencies.



QUADRANGLE NAMES

INDEX TO MAP SHEETS

BONNER COUNTY AREA, IDAHO
PARTS OF BONNER AND BOUNDARY COUNTIES

SCALE 1:380,160

3 0 3 6

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

BONNER COUNTY AREA, IDAHO, PARTS OF BONNER AND BOUNDARY COUNTIES

UNIVERSITY OF IDAHO, COLLEGE OF AGRICULTURE
IDAHO SOIL CONSERVATION COMMISSION

SOIL LEGEND

SYMBOL	NAME
1	Ardtoo gravelly sandy loam, 35 to 65 percent slopes**
2	Bonner gravelly silt loam, 0 to 4 percent slopes
3	Bonner gravelly silt loam, 30 to 65 percent slopes**
4	Bonner silt loam, cool, 0 to 4 percent slopes
5	Brickel-Rubble land association, 5 to 45 percent slopes**
6	Cabinet silt loam, 2 to 12 percent slopes
7	Cabinet silt loam, 12 to 30 percent slopes
8	Capehorn silt loam, 0 to 2 percent slopes
9	Colburn very fine sandy loam, 0 to 4 percent slopes
10	Dufort silt loam, 5 to 45 percent slopes
11	Dufort-Rock outcrop complex, 5 to 45 percent slopes**
12	Elmira loamy sand, 0 to 8 percent slopes
13	Elmira Variant loamy coarse sand, 0 to 2 percent slopes
14	Haploxeralfs and Xerochrepts, 30 to 55 percent slopes**
15	Hoodoo silt loam, 0 to 1 percent slopes
16	Hun gravelly silt loam, 35 to 65 percent slopes**
17	Jeru very stony loam, 35 to 65 percent slopes**
18	Jeru very stony sandy loam, warm, 5 to 35 percent slopes**
19	Jeru very stony sandy loam, warm, 35 to 75 percent slopes**
20	Kaniksu sandy loam, 0 to 4 percent slopes
21	Klootch gravelly sandy loam, 15 to 35 percent slopes
22	Klootch gravelly sandy loam, 35 to 65 percent slopes**
23	Kootenai gravelly silt loam, 0 to 4 percent slopes
24	Kootenai gravelly silt loam, 20 to 55 percent slopes**
25	Kootenai-Bonner gravelly silt loams, 0 to 20 percent slopes
26	Kruse silt loam, 30 to 65 percent slopes**
27	Kruse Variant silt loam, 5 to 20 percent slopes
28	Lenz-Rock outcrop association, 30 to 65 percent slopes**
29	Melder loam, 15 to 35 percent slopes
30	Melder loam, 35 to 65 percent slopes**
31	Mission silt loam, 0 to 2 percent slopes
32	Mission silt loam, 2 to 12 percent slopes
33	Mission silt loam, 12 to 30 percent slopes
34	Odenson silt loam, 0 to 2 percent slopes
35	Pend Oreille silt loam, 5 to 45 percent slopes
36	Pend Oreille-Hoodoo silt loams, 0 to 30 percent slopes
37	Pend Oreille-Rock outcrop complex, 5 to 45 percent slopes**
38	Priestlake gravelly sandy loam, 15 to 35 percent slopes**
39	Priestlake gravelly sandy loam, 35 to 65 percent slopes**
40	Prouty gravelly loam, 35 to 65 percent slopes**
41	Pywell muck, 0 to 1 percent slopes
42	Pywell-Hoodoo complex, 0 to 1 percent slopes
43	Rathdrum silt loam, 0 to 2 percent slopes
44	Rathdrum silt loam, cool, 0 to 8 percent slopes
45	Rathdrum-Bonner silt loams, 0 to 8 percent slopes
46	Rock outcrop-Rubble land complex**
47	Sagle silt loam, 5 to 30 percent slopes
48	Selle fine sandy loam, 0 to 8 percent slopes
49	Selle-Elmira complex, 0 to 20 percent slopes
50	Selle-Mission complex, 0 to 12 percent slopes
51	Treble gravelly sandy loam, 5 to 20 percent slopes
52	Treble gravelly sandy loam, 20 to 55 percent slopes**
53	Treble gravelly sandy loam, high precipitation, 15 to 35 percent slopes
54	Treble gravelly sandy loam, high precipitation, 35 to 65 percent slopes**
55	Treble-Rock outcrop association, 20 to 65 percent slopes**
56	Treble, high precipitation-Rock outcrop complex, 15 to 35 percent slopes
57	Treble, high precipitation-Rock outcrop complex, 35 to 65 percent slopes**
58	Vassar silt loam, 30 to 65 percent slopes**
59	Vassar-Moscow association, 35 to 65 percent slopes**
60	Vay gravelly silt loam, 35 to 65 percent slopes**
61	Vay silt loam, cool, 30 to 65 percent slopes**
62	Vay-Ardtoo association, 20 to 35 percent slopes**
63	Vay-Ardtoo association, 35 to 65 percent slopes**
64	Wrencoe silty clay, 0 to 2 percent slopes

** Broadly defined units

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES
- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)
- Small airport, airfield, park, oilfield, cemetery, or flood pool (Davis Airstrip; FLOOD POOL LINE)

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS
- Divided (median shown if scale permits)
- Other roads
- Poor motor road

ROAD EMBLEMS & DESIGNATIONS
- Interstate (79)
- Federal (410)
- State (52)
- County, farm or ranch (378)

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES
- Without road
- With road
- With railroad

DAMS
- Large (to scale)
- Medium or small (water; w)

PITS
- Gravel pit (G.P.)
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES
- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) (Indian Mound)
- Located object (label) (Tower)
- Tank (label) (GAS)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE
- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end

Canals or ditches
- Double-line (label) (CANAL)
- Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS
- Perennial (water; w)
- Intermittent (int; i)

MISCELLANEOUS WATER FEATURES
- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS (SvE 107)

ESCARPMENTS
- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown)

MISCELLANEOUS
- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot (0)

N

117°00'00"
48°52'30"

R. 5 W. | R. 4 W.
116°55'00"
48°54'30"

225 000 FEET

2 640 000 FEET

2 635 000 FEET

2 620 000 FEET

200 000 FEET

220 000 FEET

KANIKSU NATIONAL FOREST

FOREST BOUNDARY

NATIONAL FOREST BOUNDARY

KANIKSU NATIONAL FOREST BOUNDARY

SOIL SURVEY LIMIT

Cedar Creek

Green Bonnet Mountain

Trapper Cr.

Ruby Creek

Trapper Creek

18 19 17 20 29 30 31 32 6 5

40 46 19 17 38 39

BOUNDARY COUNTY

T. 64 N.

T. 63 N.

(Joins inset, sheet 61)

(Joins upper right)

(Joins inset)

(Joins sheet 2)

(Joins sheet 3)

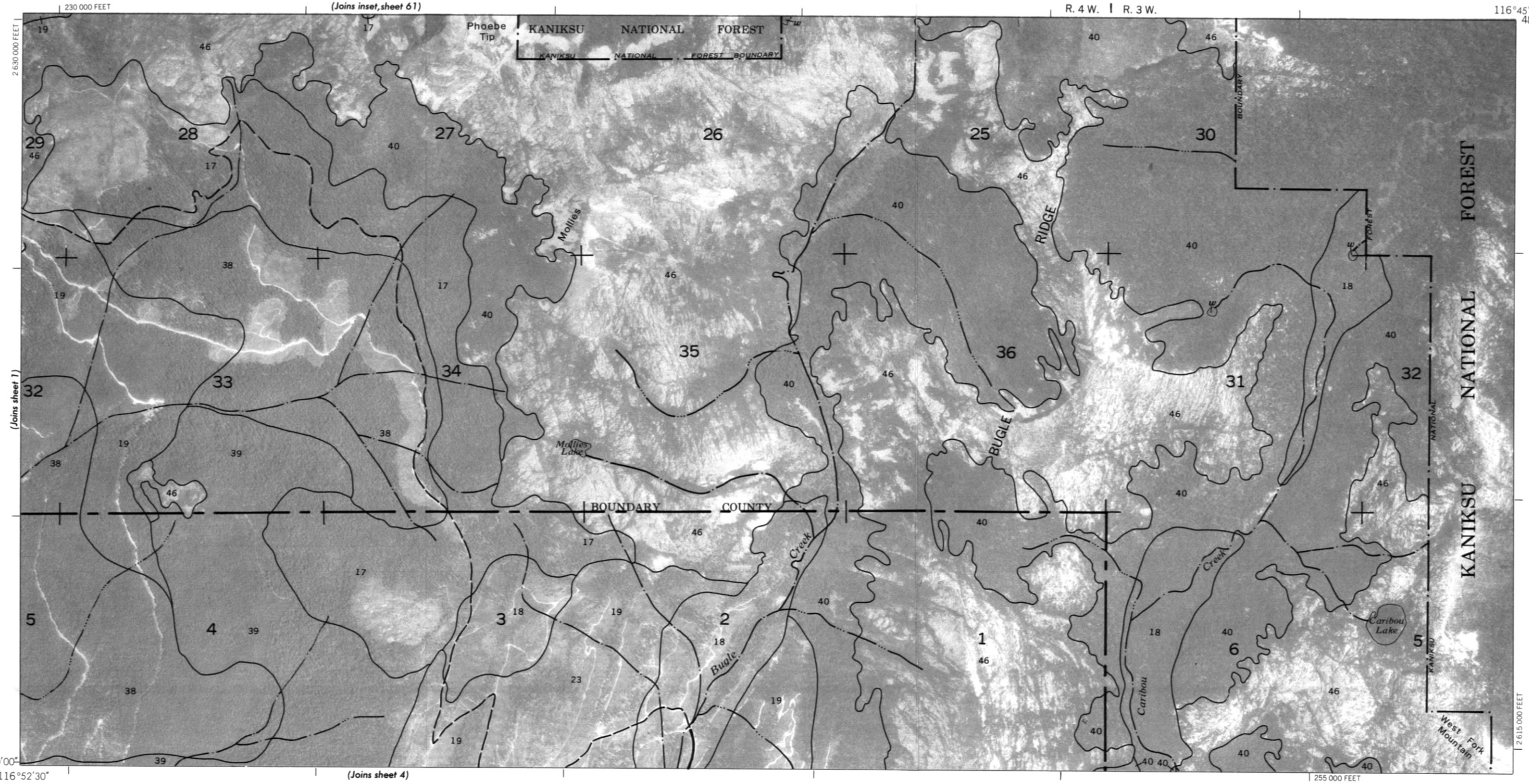
48°52'30"
116°52'30"

48°50'00"
116°52'30"

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

116°45'00" R. 3 W. 265 000 FEET

48°50'00"

KANIKSU NATIONAL FOREST

T. 63 N.

2 610 000 FEET

Abandon Mountain

BOUNDARY

FOREST

NATIONAL

KANIKSU

Abandon Creek

(Joins sheet 4)

2 600 000 FEET

260 000 FEET

(Joins sheet 6)

48°47'30"

116°42'30"

R. 5 W. | R. 4 W.

116°57'00"

48°50'00"

(Joins sheet 1)

225 000 FEET

KANIKSU NATIONAL FOREST

T. 63 N.

2 610 000 FEET

BOUNDARY

FOREST

NATIONAL

KANIKSU

Creek

East Fork Floss Creek

Trapper Creek

UPPER PRIEST LAKE

(Joins sheet 4)

2 600 000 FEET

215 000 FEET

(Joins inset, sheet 7)

48°47'30"

116°52'30"

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 4 W. | R. 3 W.

230 000 FEET

(Joins sheet 2)

116°45'00"
48°50'00"

KNF

2 610 000 FEET

T. 63 N.

(Joins sheet 3)

(Joins inset, sheet 3)

2 600 000 FEET

48°47'30"
116°52'30"

(Joins sheet 5)

255 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

5

N

R. 4 W. | R. 3 W.

116°32'30"

48°47'30"

(Joins sheet 4)

255 000 FEET

T. 62 N. | T. 63 N.

2 595 000 FEET

2 585 000 FEET

(Joins sheet 6)

230 000 FEET

(Joins sheet 7)

48°45'00"

116°45'00"

UPPER PRIEST LAKE

KANIKSU NATIONAL FOREST

PRIEST RIVER

The Thorofare

KANIKSU NATIONAL FOREST BOUNDARY

BOUNDARY COUNTY

Lookout Lake

Lookout Mountain

Caribou Creek

Lucky Creek

Lion Creek

21 22 23 24 19 20

29 28 27 26 25 30 29

33 34 35 36 31 32

4 3 2 1 6 5

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

6

N

260 000 FEET

(Joins inset, sheet 3)

R. 3 W. | R. 2 W.

116°37'30"

48°47'30"

KANIKSU NATIONAL FOREST

The Lions Head

Lions Head Ridge

Lion Creek

Kent Creek

KANIKSU NATIONAL FOREST BOUNDARY

2 595 000 FEET

(Joins sheet 5)

T. 62 N. | T. 63 N.

2 585 000 FEET

48°45'00"

116°45'00"

(Joins sheet 8)

285 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 4 W. | R. 3 W.

116°52′30″ 48°45′00″

(Joins sheet 5) 255 000 FEET

2 580 000 FEET

(Joins sheet 8)

T. 62 N.

T. 63 N.

2 570 000 FEET

230 000 FEET

(Joins sheet 9)

48°42′30″ 116°45′00″

PRIEST LAKE KANIKSU NATIONAL FOREST

BOUNDARY COUNTY

Caribou Cr.

PRIEST RIVER

The Thorofare

Lucky Creek

Lion Creek

North Fork

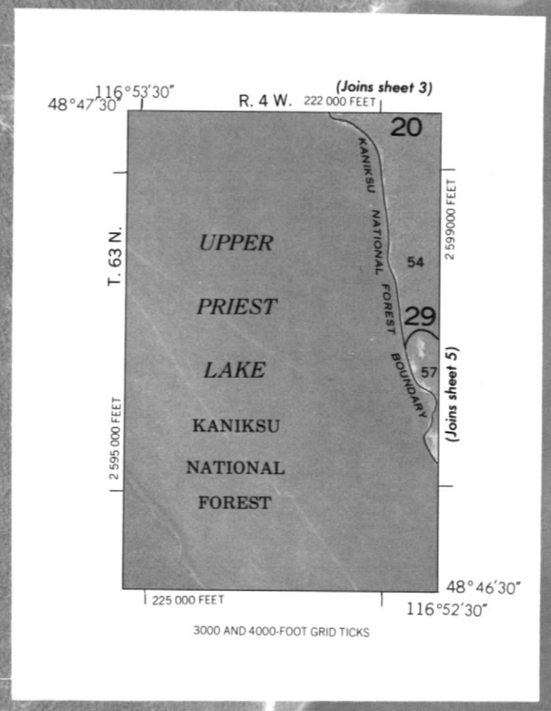
South Fork Lion Creek

Squaw Creek

Klootch Mountain

KANIKSU NATIONAL FOREST BOUNDARY

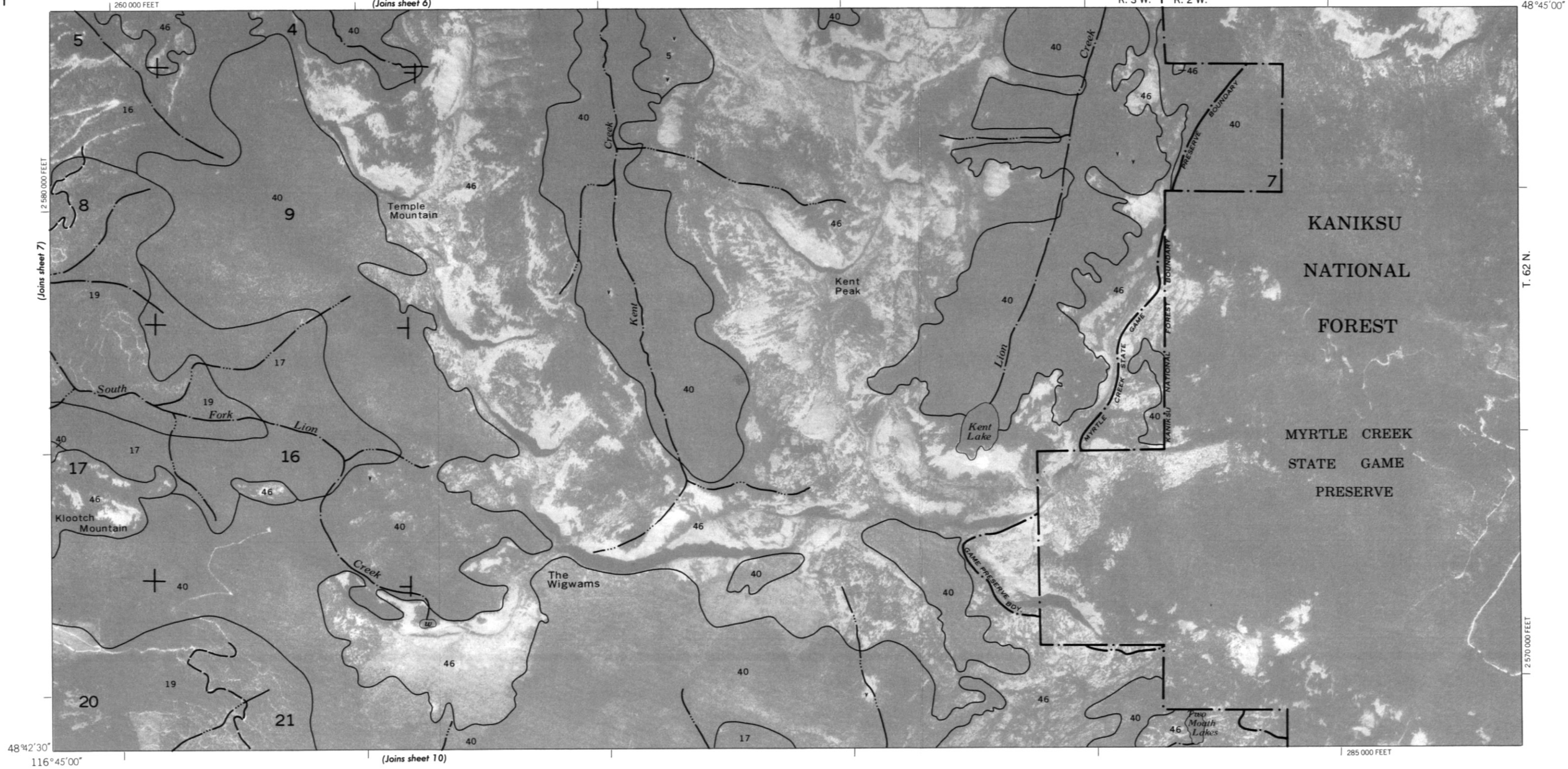
FOREST BOUNDARY



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


8
N
260 000 FEET
(Joins sheet 6)
R. 3 W.
R. 2 W.
116°37'30"
48°45'00"
2 580 000 FEET
(Joins sheet 7)
T. 62 N.
2 570 000 FEET
285 000 FEET
48°42'30"
116°45'00"
(Joins sheet 10)
Temple Mountain
Kent Peak
Kent Creek
Lion Creek
South Fork Lion Creek
Klootch Mountain
The Wigwams
Kent Lake
Two Mouth Lakes
KANIKSU NATIONAL FOREST
MYRTLE CREEK STATE GAME PRESERVE
KANIKSU NATIONAL FOREST BOUNDARY
MYRTLE CREEK STATE GAME PRESERVE BDY.
GAME PRESERVE BOUNDARY
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

116°52'30"
48°42'30"

R. 4 W. | R. 3 W.

(Joins sheet 7)

255 000 FEET

PRIEST LAKE

KANIKSU NATIONAL FOREST

BOUNDARY

Two Mouth Creek

Goose Creek

Bear Creek

22 23 24 19 20 27 26 25 30 29 35 36 31 32 34 3 2 1 6 5

T. 61 N. | T. 62 N.

2 555 000 FEET

2 565 000 FEET

(Joins sheet 10)

230 000 FEET

(Joins sheet 11)

48°40'00"
116°45'00"

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

10

N

260 000 FEET

(Joins sheet 8)

R. 3 W. | R. 2 W.

116°37'30"

48°42'30"

2 565 000 FEET

(Joins sheet 9)

Two Mouth Creek

Two Mouth Lakes

Standard Lakes

water

Goblin Knob

KANIKSU NATIONAL FOREST

KANIKSU NATIONAL FOREST BOUNDARY

T. 61 N. | T. 62 N.

2 555 000 FEET

48°40'00"

116°45'00"

(Joins sheet 12)

285 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

116°52'30"

48°40'00"

R. 4 W. | R. 3 W.

(Joins sheet 9)

255 000 FEET

T. 61 N.

2 550 000 FEET

2 540 000 FEET

PRIEST LAKE KANIKSU NATIONAL FOREST

BOUNDARY

FOREST

NATIONAL

KANIKSU

COUNTY

BOUNDARY

Bear Creek Bay

Bear Creek

Indian Creek

North Fork

South Fork

Bear Creek

North Fork

(Joins sheet 12)

(Joins sheet 13)

230 000 FEET

48°37'30"

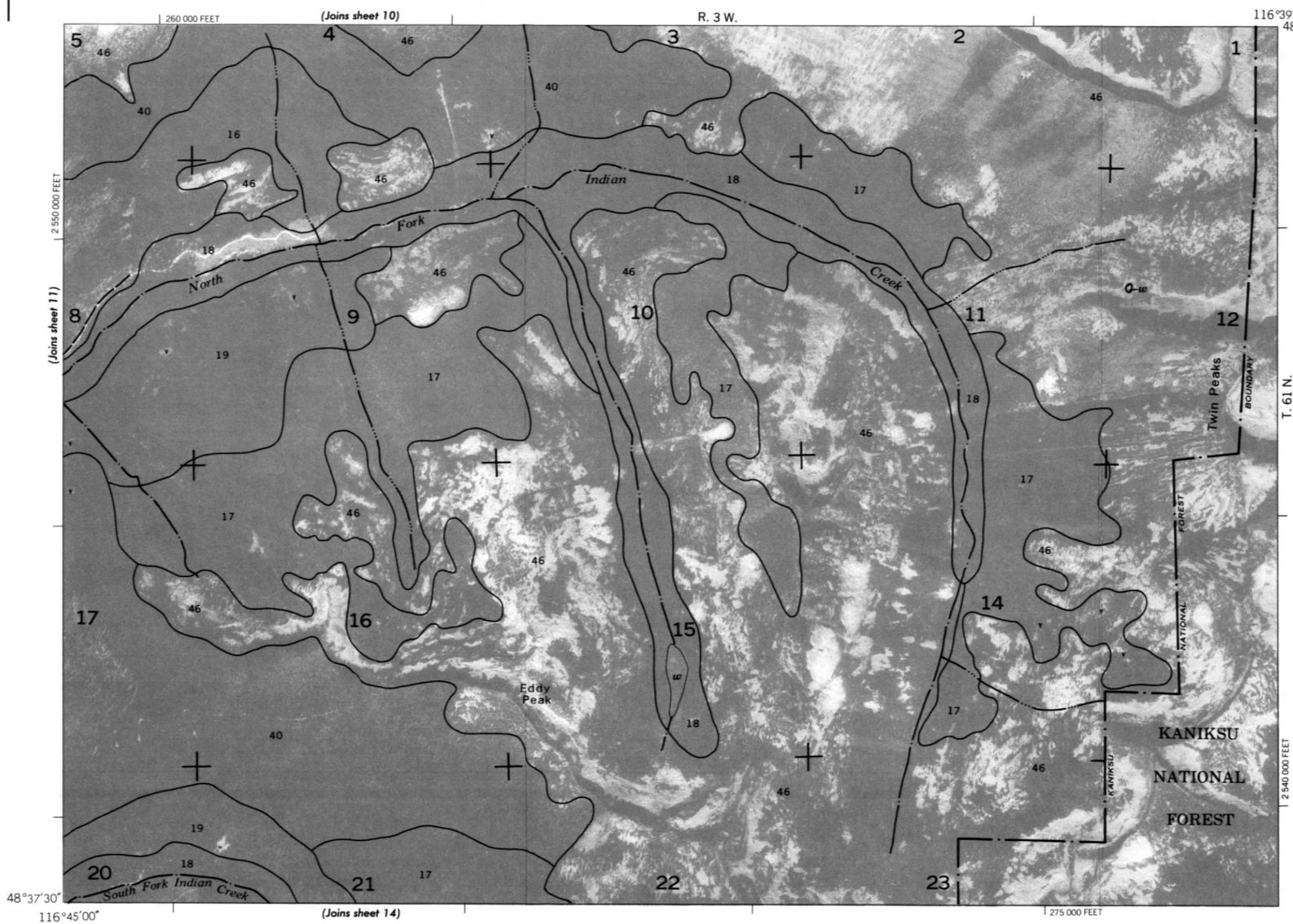
116°45'00"

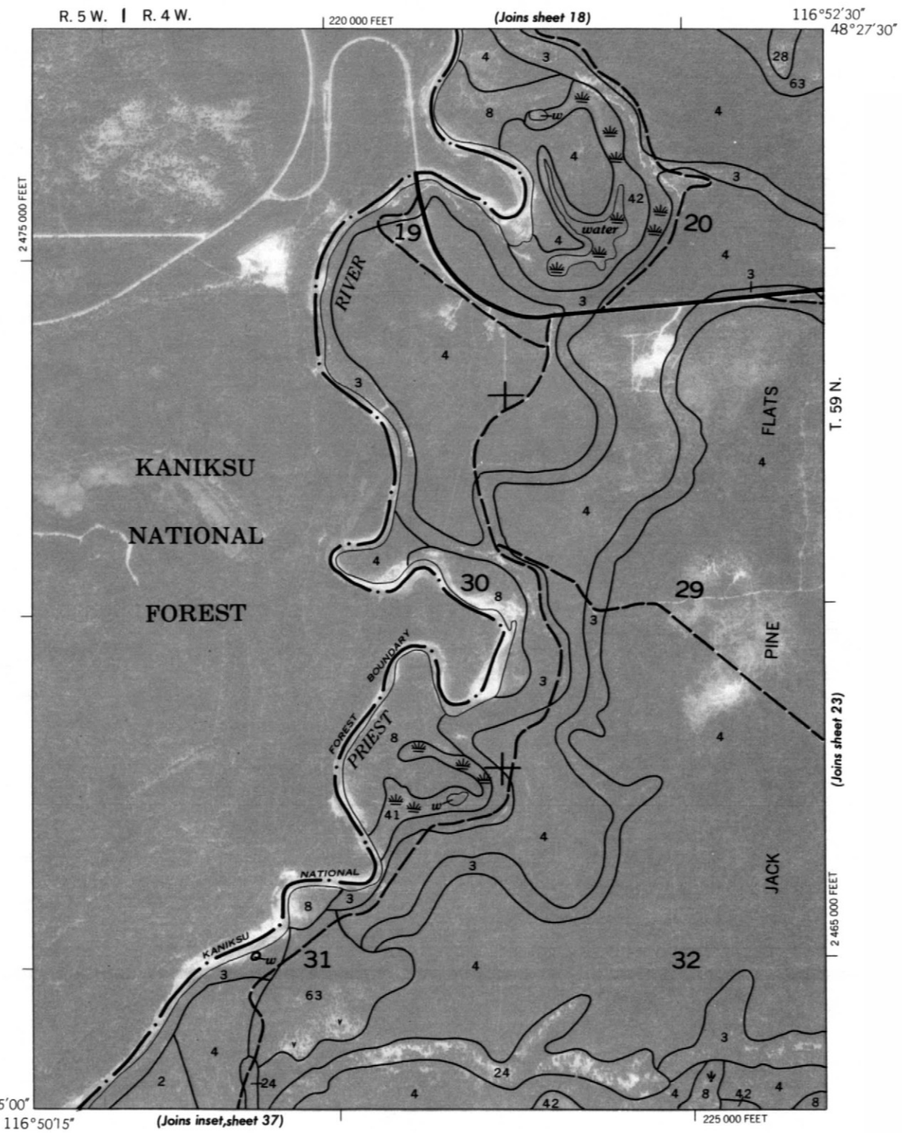
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N





1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

13

N

R. 4 W. | R. 3 W.

(Joins sheet 11)

116°52'30"

48°37'30"

255 000 FEET

2 535 000 FEET

(Joins sheet 14)

T. 60 N. | T. 61 N.

2 525 000 FEET

230 000 FEET

48°35'00"

116°45'00"

(Joins sheet 15)

PRIEST LAKE

KANIKSU NATIONAL FOREST

Cape Horn

Pinto Point

Indian Creek Bay

Indian Creek

South Fork Indian Creek

Horton Ridge

Horton Creek

Hunt Creek

KANIKSU NATIONAL FOREST BOUNDARY

COUNTY BOUNDARY

21 22 23 24 19 20

28 27 26 25 30 29

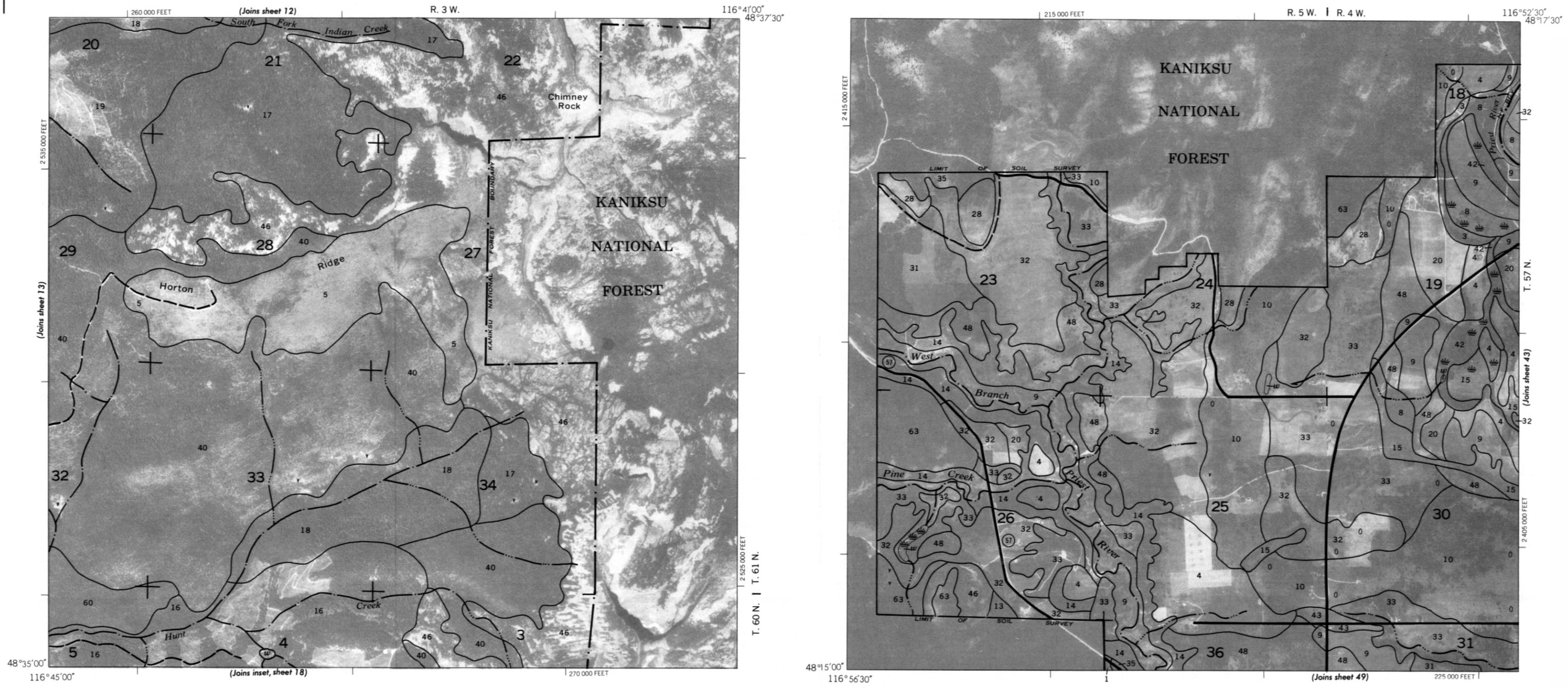
33 34 35 36 31 32

3 2 1 6 5

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 4 W. | R. 3 W.

116°52'30"

48°35'00"

(Joins sheet 13)

255 000 FEET

PRIEST LAKE

KANIKSU NATIONAL FOREST

BOUNDARY

FOREST

NATIONAL

KANIKSU

COUNTY

Horton Creek

Hunt Creek

South Fork Hunt Creek

Camels Prairie

T. 60 N.

2 520 000 FEET

(Joins inset, sheet 18)

2 510 000 FEET

230 000 FEET

(Joins sheet 16)

48°32'30"

116°45'00"

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 4 W. | R. 3 W.

230 000 FEET

(Joins sheet 15)

116°45'00"

48°32'30"

2 505 000 FEET

PRIEST LAKE

KANIKSU NATIONAL FOREST

Rocky Point

Hess Point

Cavanaugh Bay

Sherwood Beach

Cougar Creek

Fenton Creek

Soldier Creek

Camels Prairie

BOUNDARY

COUNTY

NATIONAL FOREST BOUNDARY

KANIKSU

23 24 19 20 22 27 28 26 25 30 29 35 36 31 32 34

(Joins sheet 17)

2 495 000 FEET

T. 60 N.

T. 59 N.

48°30'00"

116°52'30"

(Joins sheet 19)

255 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

48°32'30"
116°45'00"
(Joins inset, sheet 18)
R. 3 W. | R. 2 W.
285 000 FEET
48°00'00"
117°02'30"
R. 6 W. | R. 5 W.
190 000 FEET
(Joins inset, sheet 63)
2 505 000 FEET
2 310 000 FEET
2 305 000 FEET
2 495 000 FEET
T. 60 N. | T. 59 N.
T. 54 N. | T. 53 N.
(Joins sheet 16)
(Joins sheet 81)
(Joins sheet 20)
260 000 FEET
185 000 FEET
47°58'30"
117°00'00"
48°30'00"
116°37'30"

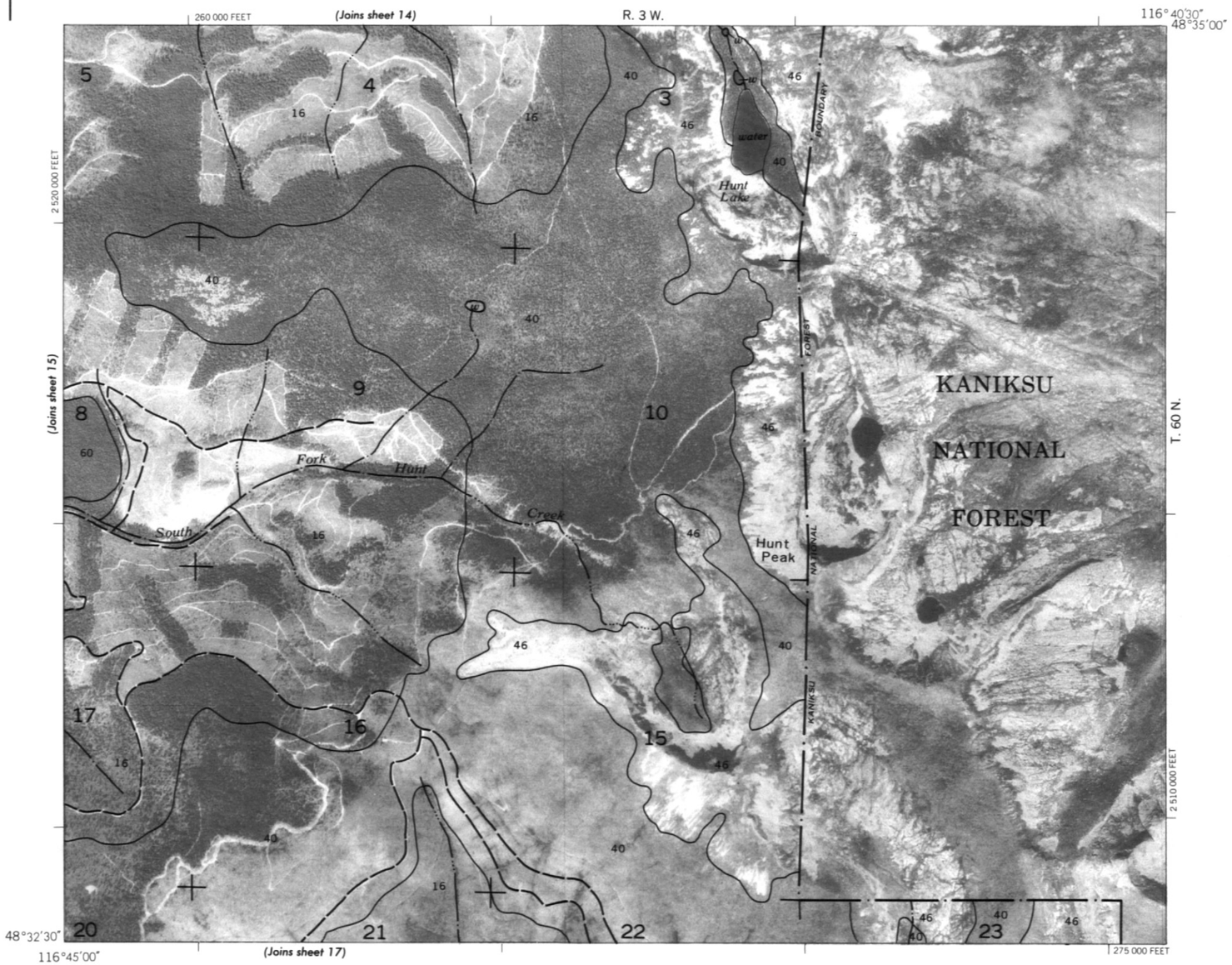
Camels Prairie
Soldier Creek
Blanchard Creek
Water
WASH
COUNTY
SPOKANE
KOOTENAI COUNTY
BOUNDARY COUNTY
KANIKSU NATIONAL FOREST
NATIONAL FOREST BOUNDARY
KNF

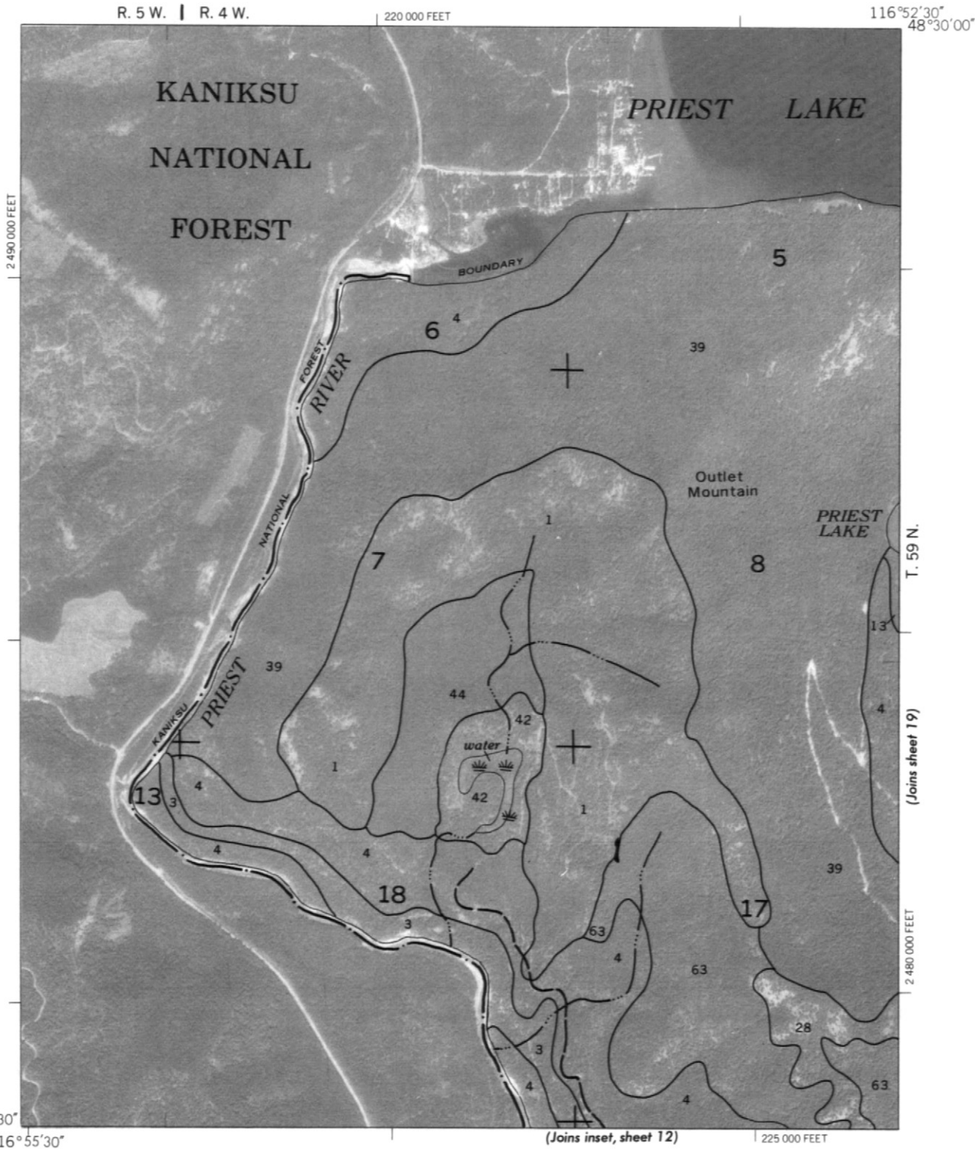
20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

16 17 19 40 43 46 58 59

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N


260 000 FEET
(Joins sheet 14)
R. 3 W.
116° 40'30"
48°35'00"
2 520 000 FEET
(Joins sheet 15)
T. 60 N.
2 510 000 FEET
48°32'30"
116°45'00"
(Joins sheet 17)
275 000 FEET
KANIKSU
NATIONAL
FOREST
BOUNDARY
FOREST
NATIONAL
KANIKSU
water
Hunt Lake
Hunt Fork
South Fork
Hunt Creek
Hunt Peak
5
4
3
8
9
10
17
16
15
20
21
22
23


R. 5 W.
R. 4 W.
220 000 FEET
116°52'30"
48°30'00"
2 490 000 FEET
T. 59 N.
2 480 000 FEET
48°27'30"
116°55'30"
(Joins inset, sheet 12)
225 000 FEET
(Joins sheet 19)
KANIKSU
NATIONAL
FOREST
PRIEST LAKE
PRIEST RIVER
BOUNDARY
FOREST
NATIONAL
KANIKSU
Outlet Mountain
water
5
6
39
7
8
1
13
18
17


1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

R. 4 W. | R. 3 W.

116°52′30″

48°30′00″

(Joins sheet 16)

255 000 FEET

KANIKSU NATIONAL FOREST

PRIEST LAKE

Sherwood Beach

BOUNDARY

NATIONAL FOREST

Soldier Creek

Lee Creek

Lee Lake

Coolin

Sundance Mountain

Chase Creek

Chase Lake

Lost Creek

T. 59 N.

(Joins sheet 18)

2 480 000 FEET

2 490 000 FEET

(Joins sheet 20)

230 000 FEET

(Joins sheet 23)

48°27′30″

116°45′00″

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

20

N

R. 3 W. | R. 2 W.

260 000 FEET

(Joins sheet 17)

116°37'30"

48°30'00"

2 490 000 FEET

(Joins sheet 19)

KANIKSU NATIONAL FOREST

KANIKSU NATIONAL FOREST BOUNDARY

Sundance Mountain

Creek

Lost

Hellroaring

Ridge

River

East

Flattop

Caribou

T. 59 N.

(Joins sheet 21)

2 480 000 FEET

48°27'30"

116°45'00"

(Joins sheet 24)

285 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

116°37'30"

48°30'00"

R. 2 W. | R. 1 W.

315 000 FEET

T. 59 N.

2 490 000 FEET

2 480 000 FEET

290 000 FEET

(Joins sheet 20)

(Joins sheet 22)

(Joins sheet 25)

48°27'30"

116°30'00"

KANIKSU NATIONAL FOREST

BOUNDARY COUNTY

BOUNDARY FOREST

KANIKSU NATIONAL FOREST

KANIKSU 15 NATIONAL FOREST

KANIKSU NATIONAL FOREST

KNF

KANIKSU NATIONAL FOREST BOUNDARY

Hellroaring Creek

Hellroaring Ridge

Caribou Creek

PACK RIVER

Tokyan Creek

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

320 000 FEET

R. 1 W. | R. 1 E.

116°22'30"

48°30'00"

2 490 000 FEET

KANIKSU NATIONAL FOREST

STATE WILDLIFE MANAGEMENT AREA

BOUNDARY COUNTY

KNF

Bloom Lake

Elmira Peak

KANIKSU NATIONAL FOREST

MOUNTAINS

SELKIRK

PURCELL TRENCH

Elmira

Deep Creek

Sand Creek

Sand Creek

NORTHERN PACIFIC GREAT NORTHERN SPOKANE INTERNATIONAL

(Joins sheet 21)

(Joins sheet 26)

48°27'30"

116°30'00"

R. 2 E.

379 000 FEET

116°14'15"

48°27'45"

2 475 000 FEET

(Joins sheet 27)

South Fork Grouse Creek

KANIKSU NATIONAL FOREST BOUNDARY

T. 59 N.

T. 58 N.

2 480 000 FEET

2 465 000 FEET

48°25'30"

116°15'00"

381 000 FEET

2000 AND 5000-FOOT GRID TICKS

35 345 000 FEET 10 35

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 4 W. | R. 3 W.

116°52'30"

48°27'30"

(Joins sheet 19)

255 000 FEET

T. 59 N.

2 475 000 FEET

(Joins sheet 24)

(Joins inset, sheet 12)

2 465 000 FEET

230 000 FEET

(Joins sheet 28)

48°25'00"

116°45'00"

Chase Lake

JACK PINE FLATS

Junta Creek

East River

20 21 22 23 24 19 20

29 28 27 26 25 30 29

32 33 34 35 36 31 32

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

116°37'30"

48°27'30"

R. 2 W. | R. 1 W. *(Joins sheet 21)*

315 000 FEET

2 475 000 FEET

T. 59 N.

(Joins sheet 26)

(Joins sheet 24)

2 465 000 FEET

290 000 FEET

(Joins sheet 30)

48°25'00"

116°30'00"

KANIKSU NATIONAL FOREST

French Creek

Berry Creek

PACK RIVER

Colburn Creek

Berry Creek

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS


26
N
320 000 FEET
(Joins sheet 22)
KANIKSU NATIONAL FOREST
R. 1 W.
R. 1 E.
116°22'30"
48°27'30"
2 475 000 FEET
(Joins sheet 25)
T. 59 N.
SELKIRK MOUNTAINS
NORTHERN
INTERNATIONAL
TRENCH
Sand Creek
KANIKSU NATIONAL FOREST
Watsh Lake
Samuels
PURCELL
Creek
PACK RIVER
Sand Creek
Creek
Grouse Creek
KANIKSU NATIONAL FOREST
(Joins sheet 27)
2 465 000 FEET
48°25'00"
116°30'00"
(Joins sheet 31)
345 000 FEET
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

116°22'30"
48°27'45"

R. 1 E. | R. 2 E.

375 000 FEET

T. 59 N.

KANIKSU NATIONAL FOREST

KANIKSU NATIONAL FOREST BOUNDARY

South Fork

Creek

Gold Creek

KNF

2 475 000 FEET

2 465 000 FEET

350 000 FEET

(Joins sheet 26)

(Joins inset, sheet 22)

(Joins sheet 32)

KANIKSU NATIONAL FOREST

48°25'00"
116°15'00"

N

(Joins inset, 14) | (Joins sheet 23)

230 000 FEET

R. 4 W. | R. 3 W.

116°45'00"

48°25'00"

T. 58 N. | T. 59 N.

2 460 000 FEET

(Joins inset, sheet 37)

JACK PINE FLATS

KANIKSU NATIONAL FOREST

PRIEST RIVER FOREST

BOUNDARY

Whitetail Butte

KANIKSU NATIONAL FOREST

RIVER

North Fork Water's Creek

East River

Middle Fork

(Joins sheet 29)

2 450 000 FEET

48°22'30"

116°52'30"

(Joins sheet 33)

KANIKSU NATIONAL FOREST

255 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

48°25'00"
116°45'00"
R. 3 W. | R. 2 W.
(Joins sheet 24)
285 000 FEET
T. 59 N.
T. 58 N.
2 460 000 FEET
(Joins sheet 30)
(Joins sheet 28)
2 450 000 FEET
260 000 FEET
(Joins sheet 34)
48°22'30"
116°37'30"

KANIKSU NATIONAL FOREST

Blue Mountain

Middle Fork East River

Jungle Creek

Tarlac Creek

Chicopee Creek

Keokee Creek

Uleda Creek

Uleda Point

Devils Creek

Colburn Creek

Colburn Lake

Schweitzer Basin

KNEDY

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

290 000 FEET

(Joins sheet 25)

R. 2 W. | R. 1 W.

116°30'00"

48°25'00"

T. 59 N.

T. 58 N.

2 460 000 FEET

(Joins sheet 29)

KNF

KANIKSU NATIONAL FOREST

Colburn

Creek

Berry Creek

Jack Creek

Swede Creek

Sand Creek

Colburn Lake

NORTHERN

(Joins sheet 31)

2 450 000 FEET

48°22'30"

116°37'30"

(Joins sheet 35)

315 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 1 E. | R. 2 E.

350 000 FEET

(Joins sheet 27)

116°15'00"

48°25'00"

T. 59 N.

T. 58 N.

2 460 000 FEET

(Joins sheet 31)

KANIKSU NATIONAL FOREST

Lightning Peak

Gold Creek

Trapper Creek

Lightning Creek

Rapid

Flume Creek

(Joins inset, sheet 69)

2 450 000 FEET

48°22'30"

116°22'30"

(Joins sheet 37)

375 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

48°22'30" 116°52'30"

R. 4 W. R. 3 W.

255 000 FEET

2 445 000 FEET

T. 58 N.

T. 57 N.

2 435 000 FEET

KANIKSU NATIONAL FOREST

PRIEST RIVER EXPERIMENTAL FOREST

KANIKSU NATIONAL FOREST BOUNDARY

PRIEST RIVER FOREST BOUNDARY

Middle Fork

East River

Priest River

water

(Joins sheet 28)

(Joins sheet 34)

(Joins sheet 38)

48°18'30" 116°53'00"

226 000 FEET

2 420 000 FEET

2 423 000 FEET

48°17'30" 116°52'30"

225 000 FEET

48°20'00" 116°45'00"

230 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

260 000 FEET

(Joins sheet 29)

R. 3 W. | R. 2 W.

116°37'30"

48°22'30"

2 445 000 FEET

T. 58 N.

PRIEST RIVER EXPERIMENTAL FOREST

KANIKSU NATIONAL FOREST

KANIKSU NATIONAL FOREST

Schweitzer Basin

Tarlac Creek

Uleda Creek

Pevitts Creek

Schweitzer Creek

(Joins sheet 33)

(Joins sheet 35)

2 435 000 FEET

48°20'00"

116°45'00"

(Joins sheet 39)

285 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

116°37'30"

48°22'30"

R. 2 W. | R. 1 W. *(Joins sheet 30)*

315 000 FEET

2 445 000 FEET

T. 58 N.

(Joins sheet 34)

2 435 000 FEET

(Joins sheet 36)

290 000 FEET

(Joins sheet 40)

48°20'00"

116°30'00"

KANIKSU NATIONAL FOREST

Schweitzer Basin

KNF

Swede Creek

Schweitzer Creek

Northern Pacific Creek

Great Northern Railway

Sand Creek

Bronx

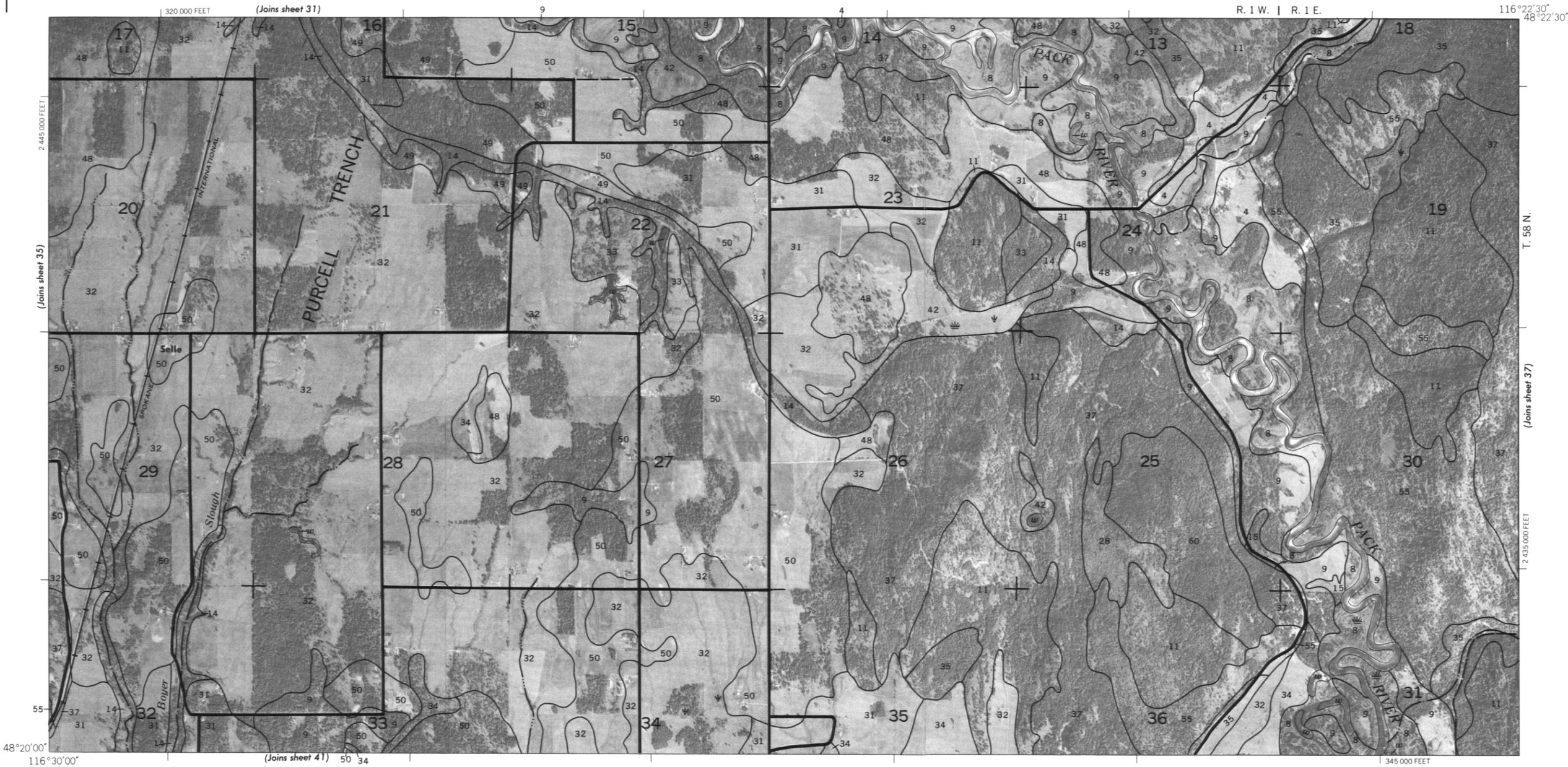
int

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

116°22'30"
48°22'30"

R. 1 E. | R. 2 E.

(Joins sheet 32) | (Joins inset, sheet 69)

380 000 FEET

2 445 000 FEET

T. 58 N.

KANIKSU NATIONAL FOREST

CABINET MOUNTAINS

Spring Creek

Trout Creek

BOUNDARY

(Joins sheet 36)

2 435 000 FEET

(Joins sheet 42)

350 000 FEET

48°20'00"
116°15'00"

(Joins inset, sheet 12)

116°55'45"
48°25'00"
T. 59 N.
T. 58 N.

R. 5 W. | R. 4 W.

225 000 FEET

2 462 000 FEET

2 460 000 FEET

PRIEST RIVER

KANIKSU NATIONAL FOREST

BOUNDARY

(Joins sheet 28)

215 000 FEET

2000 AND 5000-FOOT GRID TICKS

48°24'15"
116°52'35"

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

230 000 FEET

(Joins sheet 33)

R. 4 W. | R. 3 W.

116°45'00"

48°20'00"

2 430 000 FEET

T. 57 N. | T. 58 N.

KANIKSU NATIONAL FOREST

KANIKSU NATIONAL FOREST BOUNDARY

KANIKSU NATIONAL FOREST

Big Creek

North Fork

Prater Creek

Ranger Creek

Prater Mountain

Happy Fork

KANIKSU

(Joins inset, sheet 33)

(Joins sheet 39)

2 420 000 FEET

48°17'30"

116°52'30"

(Joins sheet 43)

255 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

116°45'00"

48°20'00"

R. 3 W. | R. 2 W.

(Joins sheet 34)

285 000 FEET

T. 57 N. | T. 58 N.

2 430 000 FEET

(Joins sheet 40)

(Joins sheet 38)

2 420 000 FEET

260 000 FEET

(Joins sheet 44)

48°17'30"

116°37'30"

Bald Mountain

North Fork Big Creek

Little Sand Creek

KANIKSU NATIONAL FOREST

Koch Creek

Happy Fork Gap

McCormack Creek

Happy Meadows

Fork

Turnipseed Creek

Carr Creek

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

290 000 FEET

(Joins sheet 35)

R. 2 W. | R. 1 W.

116°30'00"

48°20'00"

2 430 000 FEET

T. 57 N. | T. 58 N.

(Joins sheet 39)

(Joins sheet 41)

2 420 000 FEET

KANIKSU NATIONAL FOREST

KANIKSU NATIONAL FOREST

Little Sand Creek

Spring Creek

NORTHERN PACIFIC

GREAT NORTHERN

INTERNATIONAL

SPOKANE, PORTLAND & SEATTLE

Kootenai

Ponderay

Kootenai Bay

Airport

LAKE PEND OREILLE

48°17'30"

116°37'30"

(Joins sheet 45)

315 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

116°30'00"

48° 20'00"

T. 57 N. | T. 58 N.

(Joins sheet 36)

R. 1 W. | R. 1 E.

345 000 FEET

2 430 000 FEET

(Joins sheet 42)

(Joins sheet 40)

2 420 000 FEET

320 000 FEET

(Joins sheet 46)

48°17'30"

116°22'30"

LAKE PEND OREILLE

Oden Bay

Kootenai Point

Boyer Slough

Pack River

Pack River Flats

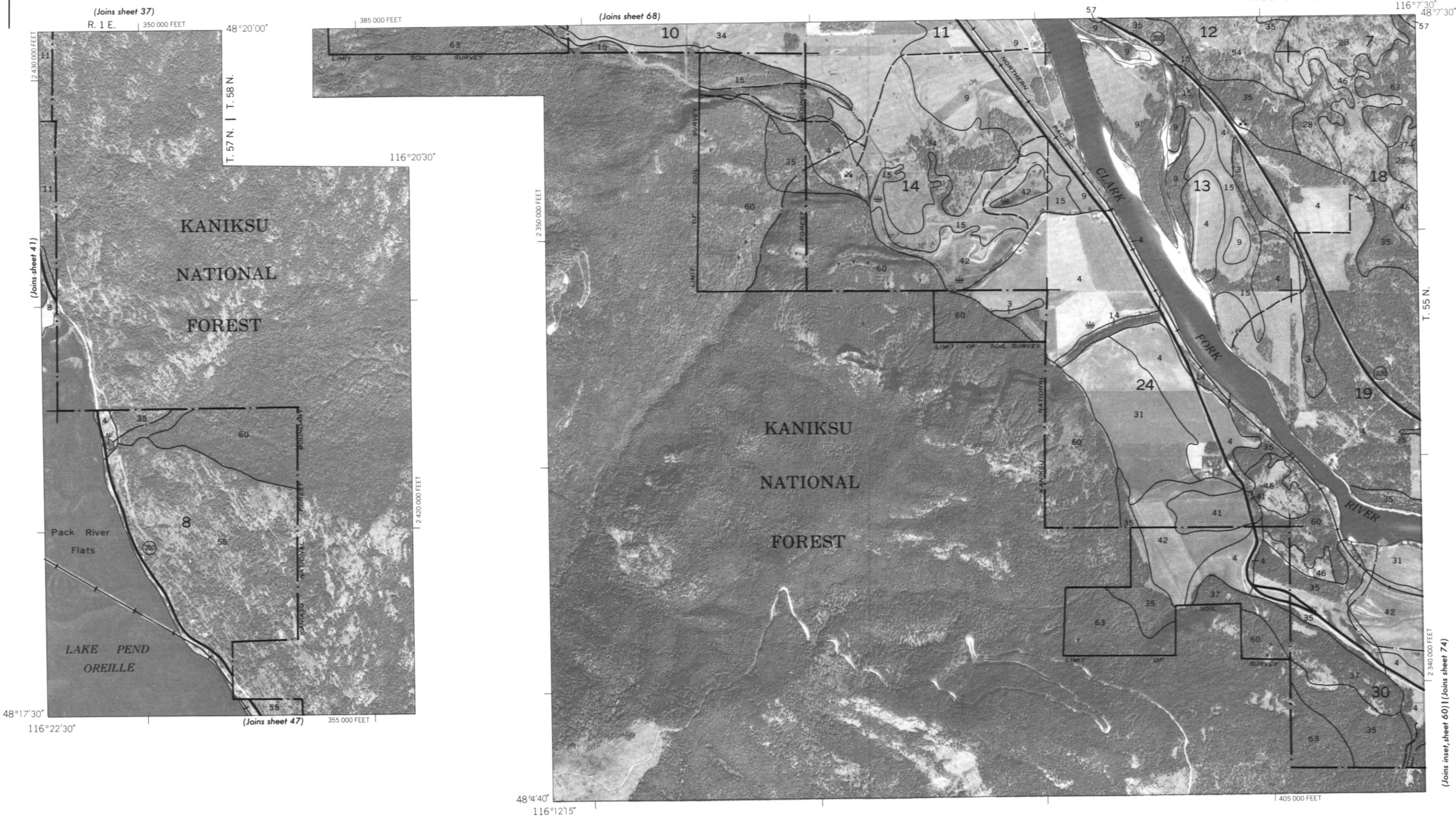
Sunnyside Mountain

NORTHERN PACIFIC

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


N
(Joins sheet 37)
R. 1 E.
350 000 FEET
48°20'00"
385 000 FEET
(Joins sheet 68)
R. 2 E.
R. 3 E.
116°7'30"
48°7'30"
2 430 000 FEET
T. 58 N.
T. 57 N.
116°20'30"
2 350 000 FEET
T. 55 N.
(Joins sheet 41)
KANIKSU
NATIONAL
FOREST
LIMIT OF SOIL SURVEY
KANIKSU NATIONAL FOREST BOUNDARY
NORTHERN PACIFIC
CLARK FORK
RIVER
Pack River Flats
LAKE PEND OREILLE
2 420 000 FEET
48°17'30"
116°22'30"
(Joins sheet 47)
355 000 FEET
48°4'40"
116°12'15"
405 000 FEET
2 340 000 FEET
(Joins inset, sheet 60) | (Joins sheet 74)

N

116°52'30"

48°17'30"

(Joins sheet 38)

R. 4 W. | R. 3 W.

255 000 FEET

2 415 000 FEET

(Joins sheet 44)

T. 57 N.

(Joins inset, sheet 14)

2 405 000 FEET

230 000 FEET

(Joins sheet 50)

48°15'00"

116°45'00"

Priest River

LIMIT OF SE

FOREST BOUNDARY

RIVER

Ranger

Creek

Blue

Lake

Creek

Blue

Creek

KANIKSU

NATIONAL

FOREST

NATIONAL

KANIKSU

PRIEST

Little

Pine

Creek

KANIKSU

NATIONAL

FOREST

BOUNDARY

NATIONAL

KANIKSU

FOREST

16 15 14 13 18

17 20 21 22 23 24 19

19 30 29 28 27 26 25 30 31

31 32 33 34 35 36 31

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 3 W. | R. 2 W.

116°37'30"
48°17'30"

260 000 FEET

(Joins sheet 39)

2 415 000 FEET

T. 57 N.

(Joins sheet 43)

(Joins sheet 45)

2 405 000 FEET

48°15'00"
116°45'00"

(Joins sheet 51)

285 000 FEET

Johnny Long Mountain

Canyon Gap

KANIKSU NATIONAL FOREST

Smith Creek

Cart Creek

Hornbi Creek

Johnson Creek

PEND OREILLE RIVER

NORTHERN

GREAT

SPOKANE

INTERNATIONAL

Little Muskrat Lake

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

116°37'30"

48°17'30"

(Joins sheet 40)

315 000 FEET R. 2 W. | R. 1 W.

2 415 000 FEET

(Joins sheet 46)

T. 57 N.

(Joins sheet 44)

2 405 000 FEET

290 000 FEET

(Joins sheet 52)

48°15'00"

116°30'00"

LAKE PEND OREILLE

PEND OREILLE RIVER

SANDPOINT

Dover

Contest Point

Turnipseed Creek

Chuck Slough

Hays Gulch

KANIKSU NATIONAL FOREST

KNF

NORTHERN

GREAT

INTERNATIONAL

SPOKANE

PACIFIC

18 17 16 15 14 13

19 20 21 22 23 24

30 29 28 27 26 25

31 32 33 34 35 36

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

320 000 FEET

(Joins sheet 41)

R. 1 W. | R. 1 E.

116°22'30"

48°17'30"

2 415 000 FEET

(Joins sheet 45)

T. 57 N.

(Joins sheet 47)

2 405 000 FEET

LAKE PEND OREILLE

Fisherman Island

Sunnyside Mountain

Contest Point

KANIKSU NATIONAL FOREST

KNF

Bottle Bay

48°15'00"

116°30'00"

(Joins sheet 53)

345 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

116° 22'30"
48°17'30"

(Joins sheet 42)

R. 1 E | R. 2 E.

375 000 FEET

T. 57 N.

LAKE PEND OREILLE

KANIKSU NATIONAL FOREST

KANIKSU NATIONAL FOREST BOUNDARY

NORTHERN PACIFIC

Hope

2 405 000 FEET

(Joins sheet 46)

350 000 FEET

116°15'00"
48°14'30"

R. 2 E.

385 000 FEET

T. 56 N.

2 415 000 FEET

2 395 000 FEET

2 390 000 FEET

(Joins sheet 54)

KANIKSU NATIONAL FOREST

KANIKSU NATIONAL FOREST BOUNDARY

LIMIT OF SOIL SURVEY

380 000 FEET

(Joins sheet 62)

48°12'45"

116°12'40"

48°15'

116°15'00"

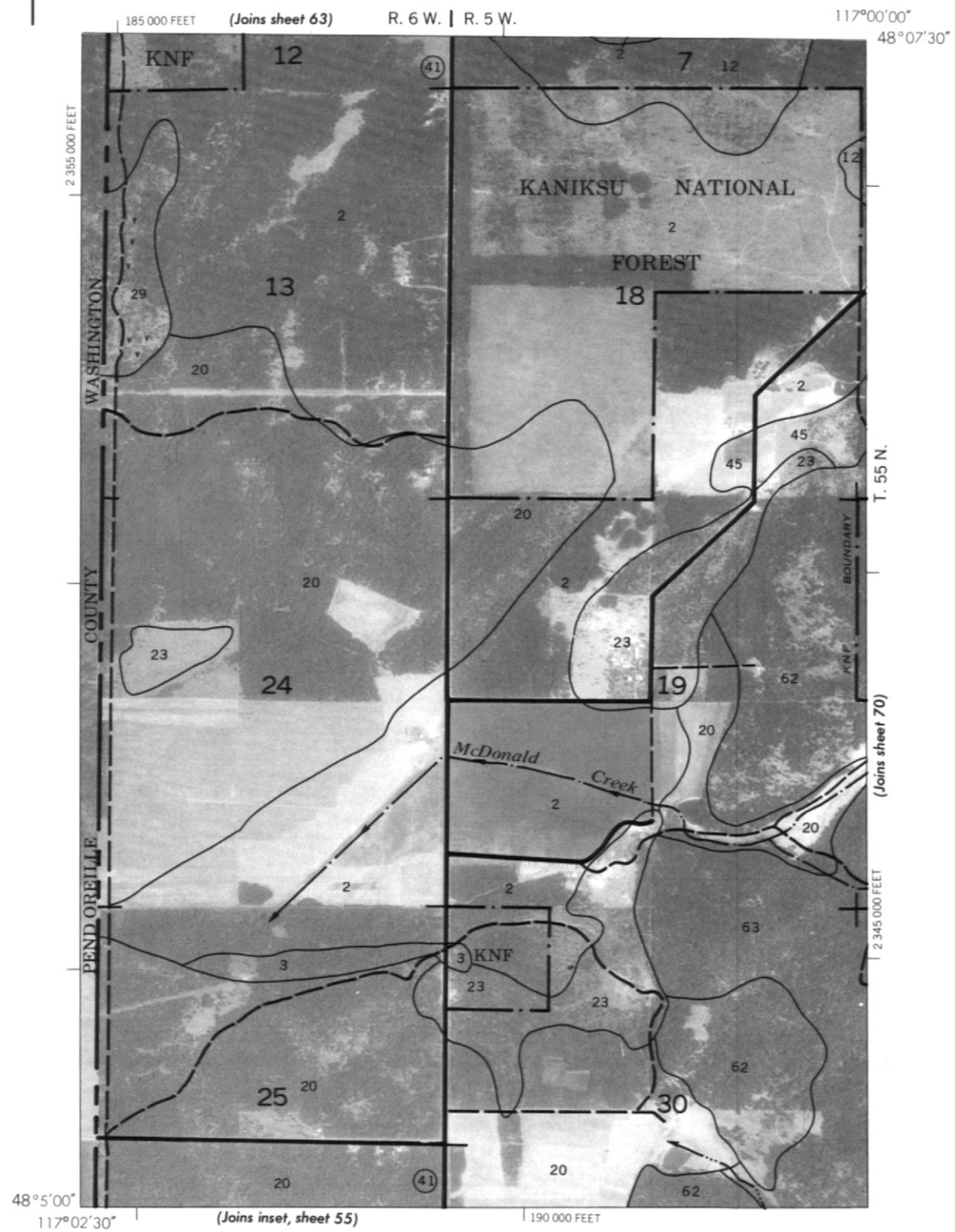
(Joins sheet 54)

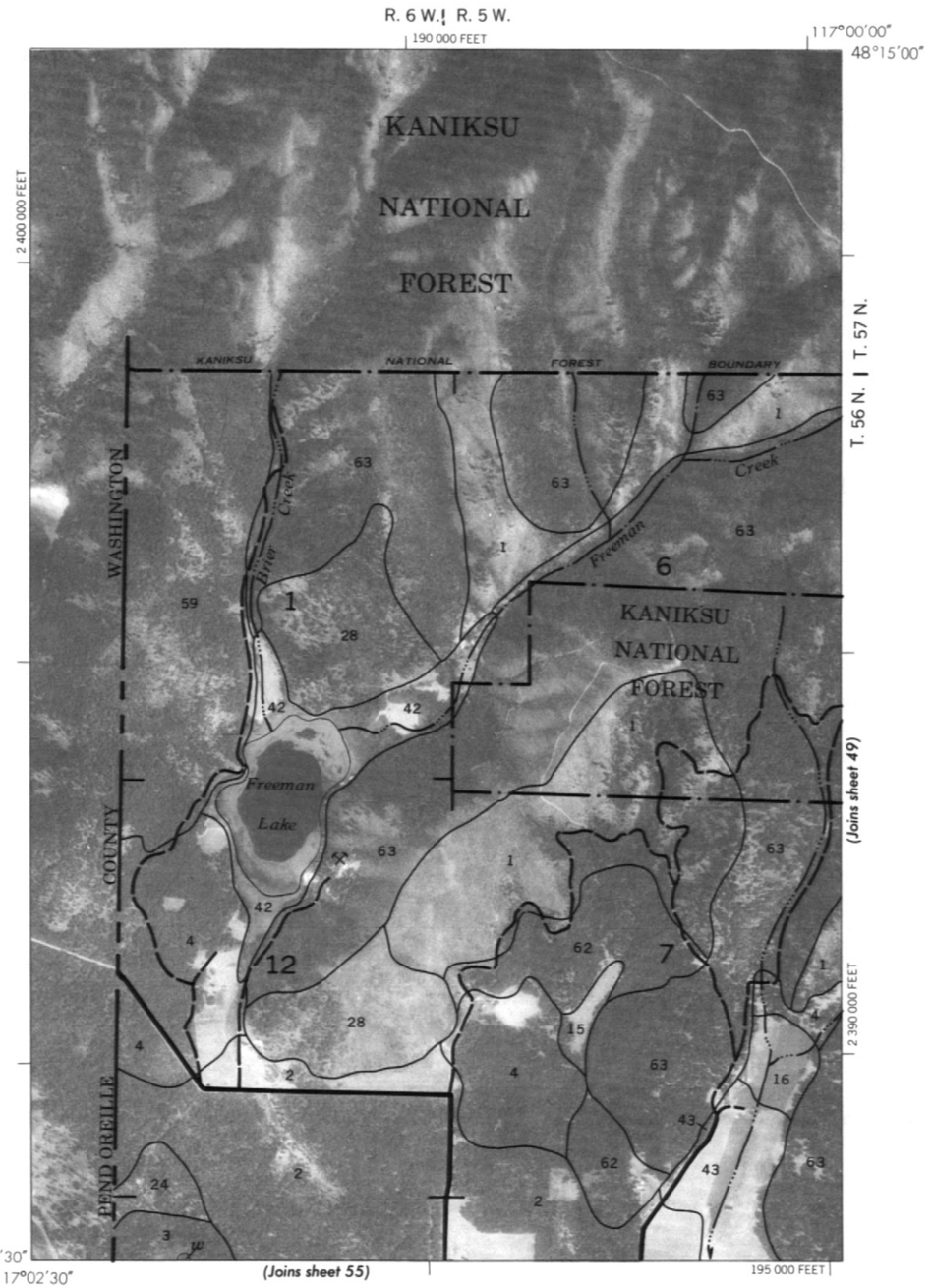
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N





1 3/4 1/2 1/4 0 1 2 MILES

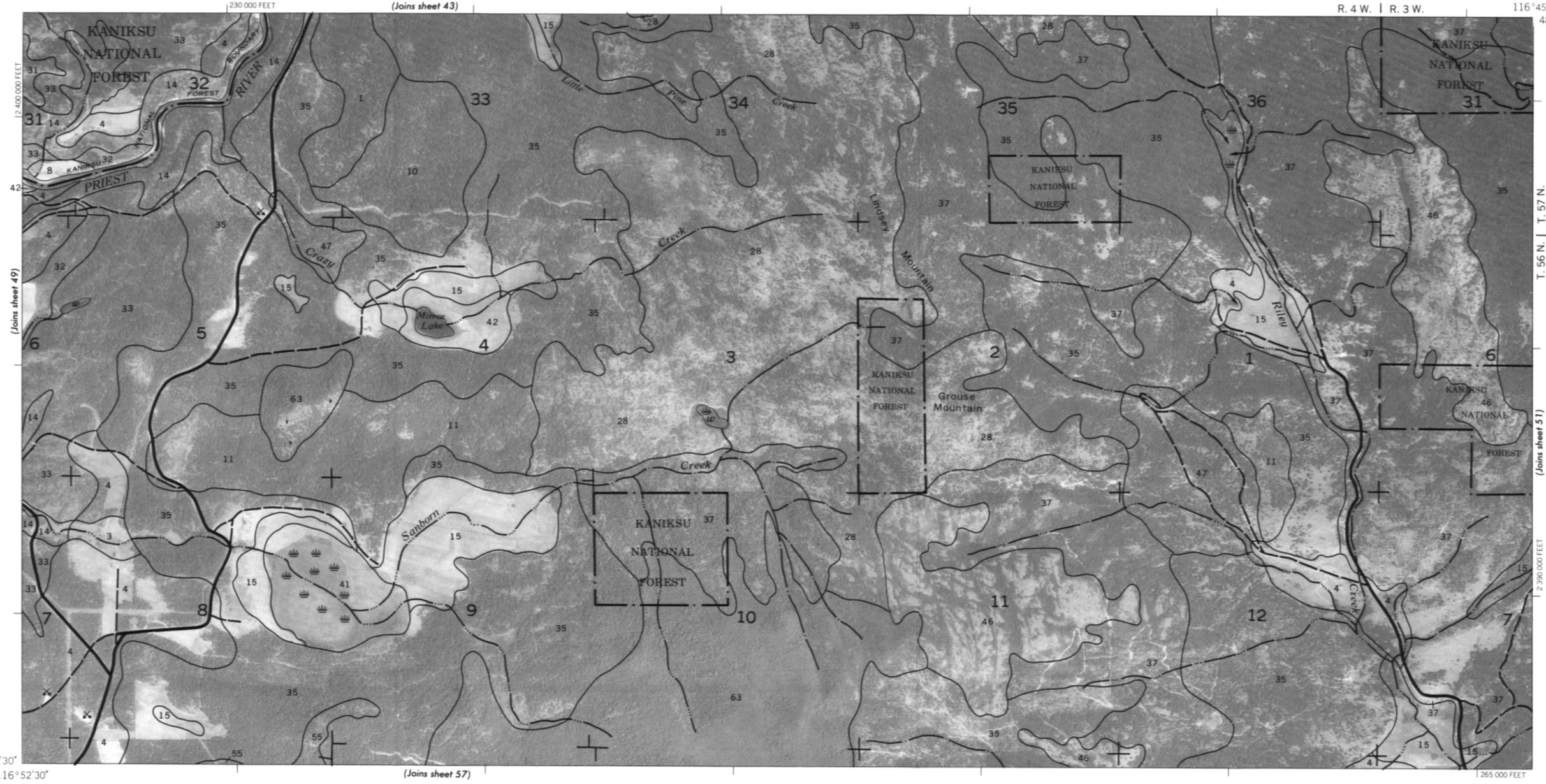
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

117°00'00"
48°15'00"
(Joins inset, sheet 14)
R. 5 W. | R. 4 W.
225 000 FEET
2 400 000 FEET
T. 57 N.
T. 56 N.
KANIKSU NATIONAL FOREST
KANIKSU NATIONAL FOREST BOUNDARY
SOIL SURVEY LIMIT
Freeman Cr.
Newport Hill
Saddler Creek
Cuban Creek
West Branch Lower Priest River
Sundborn Creek
KANIKSU NATIONAL FOREST
(Joins sheet 48)
(Joins sheet 50)
2 390 000 FEET
200 000 FEET
(Joins sheet 56)
48°12'30"
116°52'30"

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000


50
N
230 000 FEET
(Joins sheet 43)
R. 4 W. | R. 3 W.
116°45'00"
48°15'00"
2 400 000 FEET
KANIKSU NATIONAL FOREST
BOUNDARY
RIVER
PRIEST
Little Pine Creek
Crazy Creek
Mirror Lake
Lindsey Mountain
Creek
Grouse Mountain
Riley Creek
Sanborn Creek
T. 56 N. | T. 57 N.
(Joins sheet 49)
(Joins sheet 51)
2 390 000 FEET
48°12'30"
116°52'30"
(Joins sheet 57)
265 000 FEET
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

R. 3 W. | R. 2 W.

116°45'00"

48°15'00"

(Joins sheet 44)

285 000 FEET

2 400 000 FEET

T. 56 N. | T. 57 N.

(Joins sheet 50)

2 390 000 FEET

260 000 FEET

(Joins sheet 52)

(Joins sheet 58)

48°12'30"

116°37'30"

KANIKSU NATIONAL FOREST

PEND OREILLE RIVER

Lake

Little Lake

Muskrat

NORTHERN

INTERNATIONAL

Johnson Creek

Wrencoe

GREAT

Water

SPOKANE

MORTON SLOUGH

int

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 2 W. | R. 1 W.

116° 30' 00"

48° 15' 00"

290 000 FEET

2 400 000 FEET

(Joins sheet 45)

(Joins sheet 51)

(Joins sheet 53)

(Joins sheet 59)

T. 56 N. | T. 57 N.

2 390 000 FEET

315 000 FEET

48° 12' 30"

116° 37' 30"

PEND OREILLE RIVER

Dover

Tank Hill

Springy Point

Murphey Bay

Murphey Slough

Hays Gulch

KNF

KANIKSU NATIONAL FOREST

PACIFIC

NORTHERN

Fry Creek

Sagle Slough

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

116°30'00"
48°15'00"

(Joins sheet 46) R. 1 W. | R. 1 E. 345 000 FEET

T. 57 N.
T. 56 N.

2 400 000 FEET

(Joins sheet 54)

(Joins sheet 52)

2 390 000 FEET

KANIKSU NATIONAL FOREST

KNF

Bottle Bay

water

Gamble Lake

Providence Lake

Livermore Lake

320 000 FEET

(Joins sheet 60)

48°12'30"
116°22'30"

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 1 E. | R. 2 E.

116°15'00"

48°15'00"

350 000 FEET

(Joins sheet 47)

2 400 000 FEET

(Joins sheet 53)

T. 56 N. | T. 57 N.

2 390 000 FEET

(Joins inset, sheet 47)

(Joins sheet 62)

375 000 FEET

48°12'30"

116°22'30"

(Joins sheet 61)

Sunrise Bay

Martin Bay

Glengary

Picard Point

Warren Island

Cottage Island

Pearl Island

PEND OREILLE LAKE

East Hope

Ellisport Bay

Owens Bay

Denton Slough

Creek

NORTHERN PACIFIC

DAVID THOMPSON STATE GAME PRESERVE

KANIKSU NATIONAL FOREST

KANIKSU NATIONAL FOREST BOUNDARY

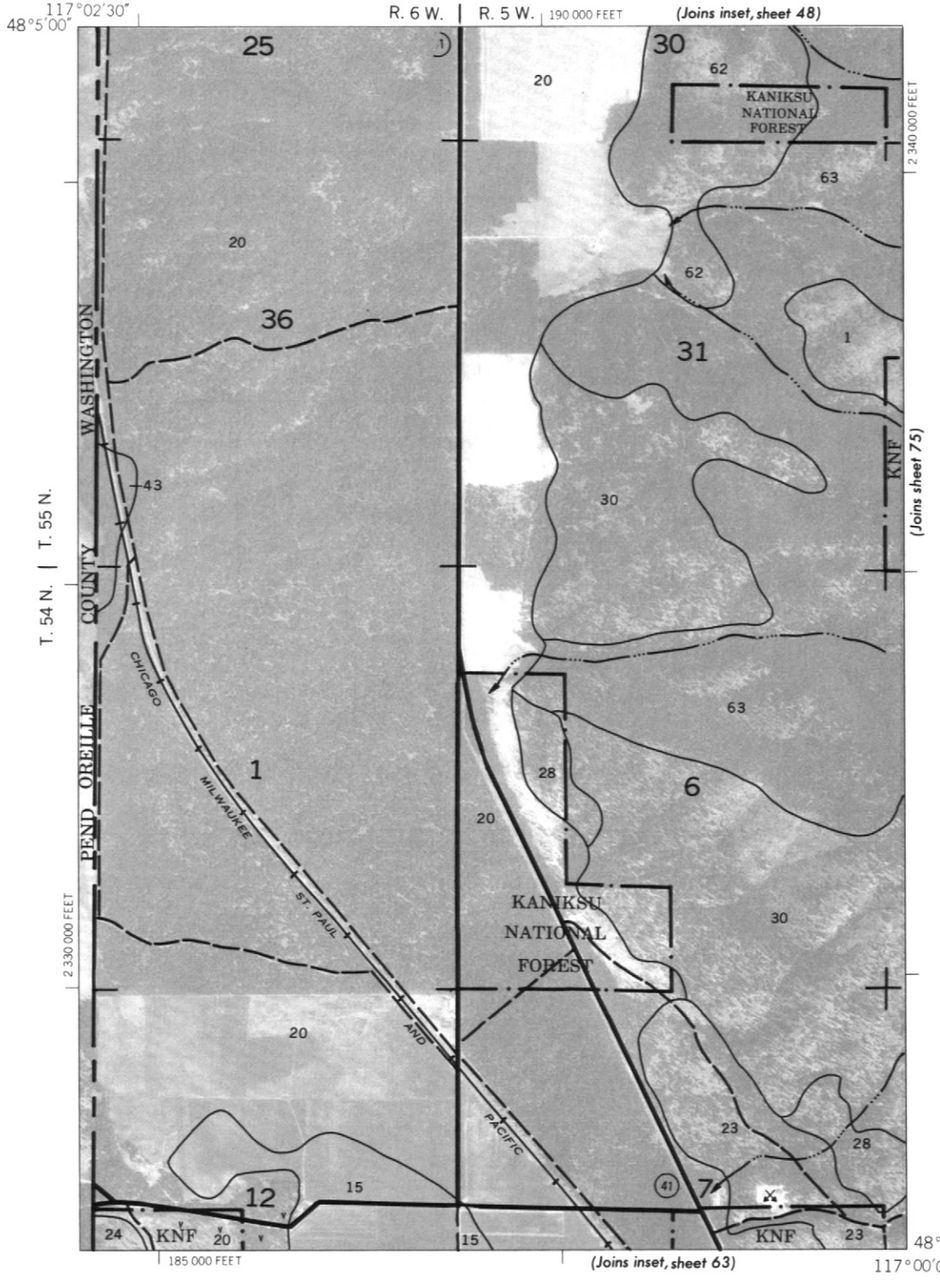
DAVID THOMPSON STATE GAME PRESERVE BOUNDARY

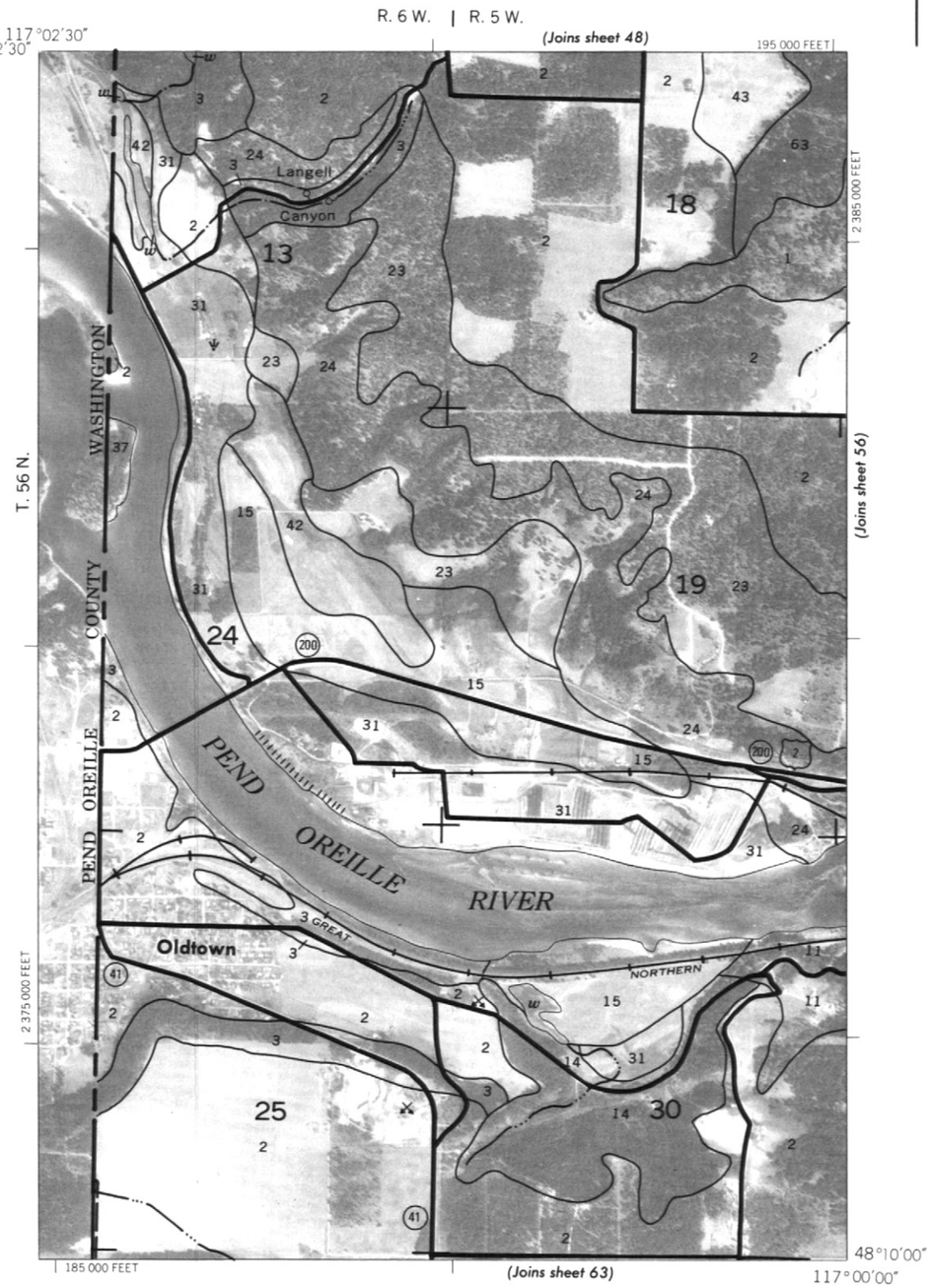
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N





1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

200 000 FEET

(Joins sheet 49)

R. 5 W. | R. 4 W.

116°52'30"

48°12'30"

2 385 000 FEET

(Joins sheet 55)

T. 56 N.

(Joins sheet 57)

2 375 000 FEET

KANIKSU NATIONAL FOREST

KNF

PRIEST RIVER

Bodie Creek

Falls Creek

Canyon Creek

Albeni Falls

Alder Creek

GREAT NORTHERN

Albeni Cove

Strong Island

PEND OREILLE RIVER

water

48°10'00"

117°00'00"

(Joins sheet 64)

225 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

116°52'30"
48°12'30"

(Joins sheet 50)

R. 4 W. | R. 3 W.

265 000 FEET

2 385 000 FEET

(Joins sheet 58)

T. 56 N.

(Joins sheet 56)

2 375 000 FEET

Alder Creek

Gold Cup Mountain

KANIKSU NATIONAL FOREST

Manley Creek

Riley Creek

PEND OREILLE RIVER

THE SETTLEMENT

Clarkia

Loclede

KNF

230 000 FEET

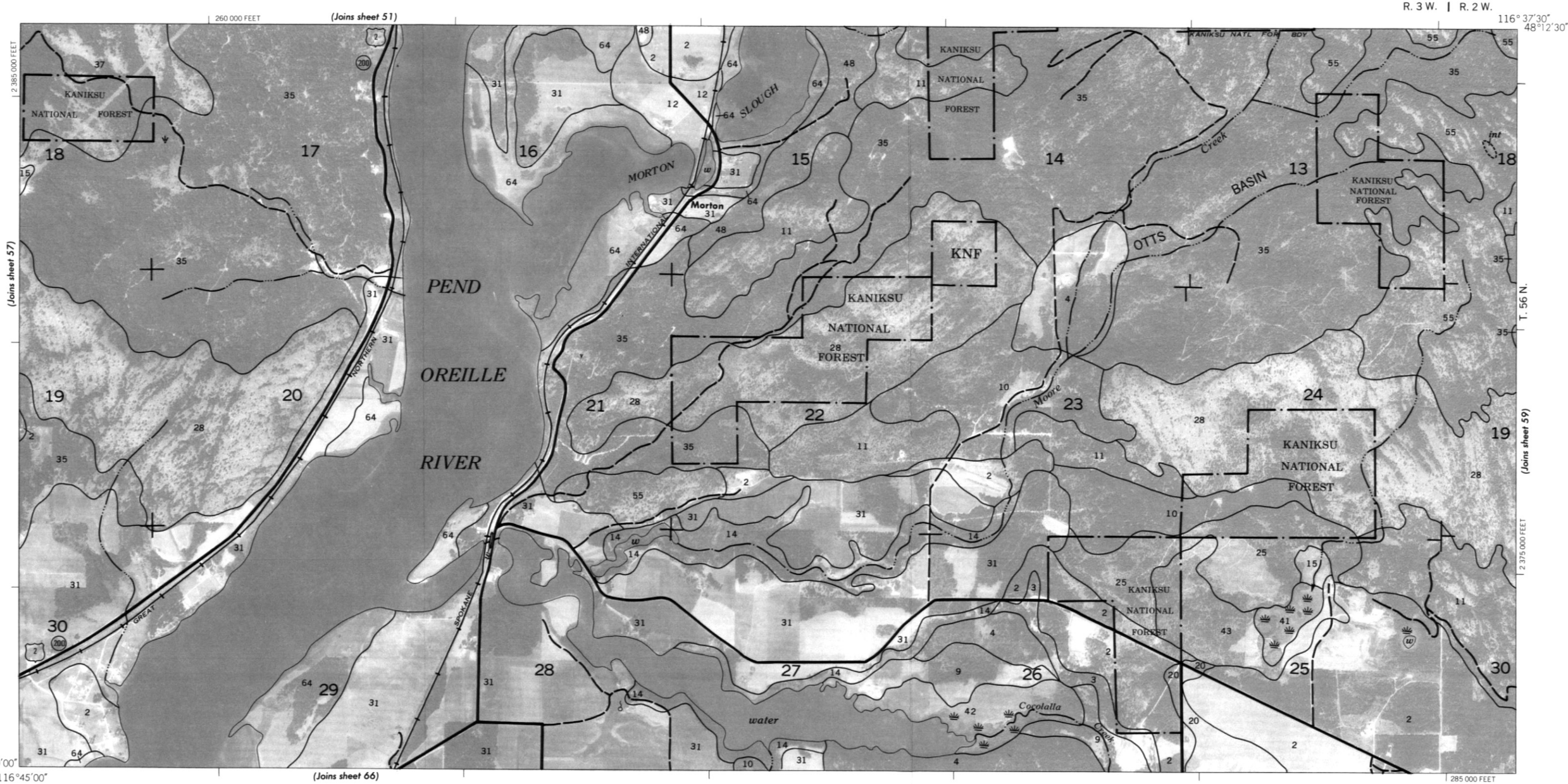
(Joins sheet 65)

48°10'00"
116°45'00"

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 2 W. | R. 1 W.

116° 37′ 30″

48° 12′ 30″

315 000 FEET

2 385 000 FEET

2 375 000 FEET

290 000 FEET

T. 56 N.

(Joins sheet 52)

(Joins sheet 60)

(Joins sheet 58)

(Joins sheet 67)

48° 10′ 00″

116° 30′ 00″

Sagle

Algoma

KANIKSU NATIONAL FOREST

KANIKSU NATIONAL FOREST BOUNDARY

Heath Lake

Algoma Lake

Shepherd Lake

Westmond Creek

Mirror Lake

PACIFIC NORTHERN

int

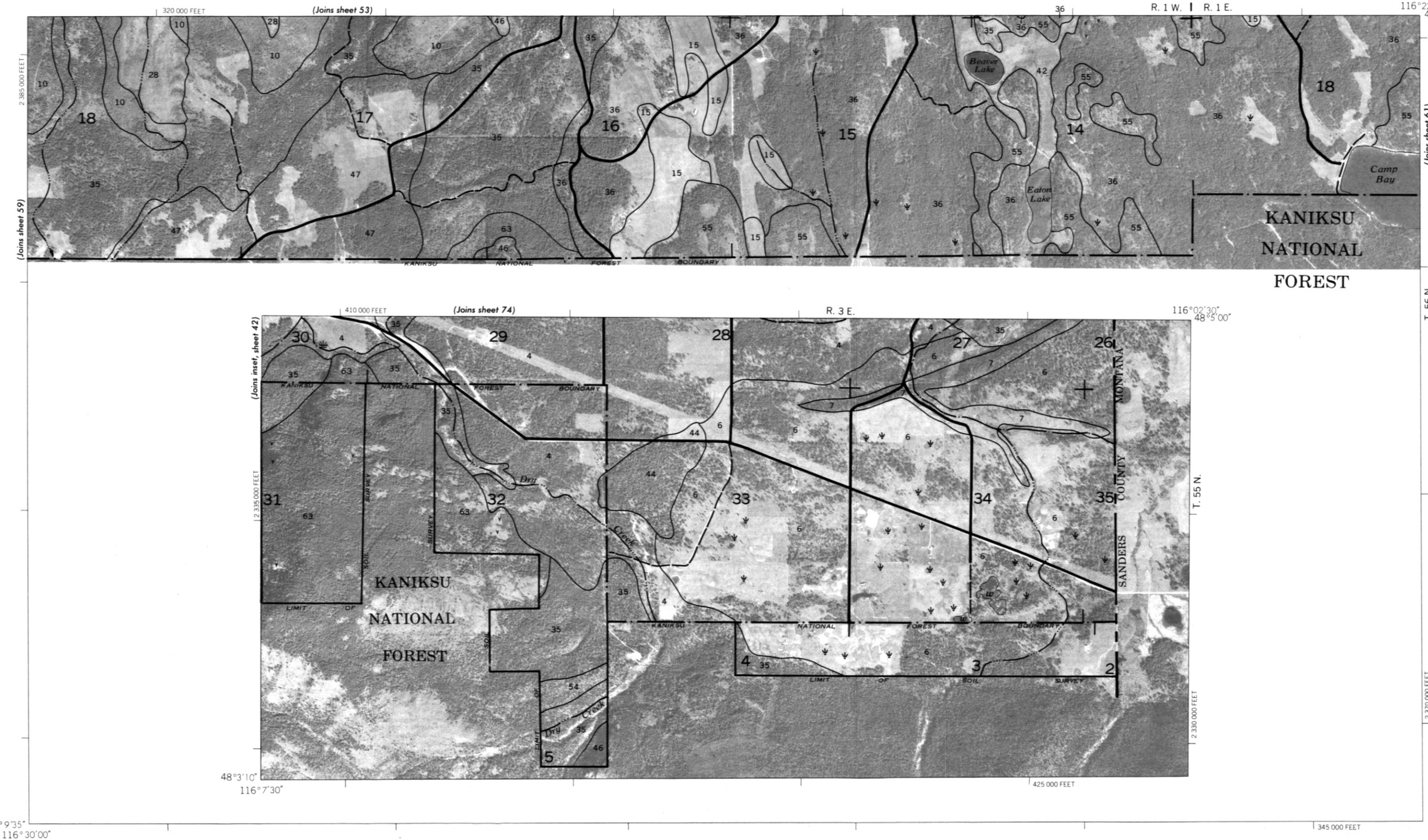
water

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N


320 000 FEET
(Joins sheet 53)
R. 1 W.
R. 1 E.
116°22'30"
48°12'30"
2 385 000 FEET
(Joins sheet 59)
(Joins sheet 61)
T. 56 N.
Beaver Lake
Eaton Lake
Camp Bay
KANIKSU NATIONAL FOREST BOUNDARY
KANIKSU NATIONAL FOREST
410 000 FEET
(Joins sheet 74)
R. 3 E.
116°02'30"
48°5'00"
(Joins inset, sheet 42)
MONTANA
SANDERS COUNTY
T. 55 N.
2 335 000 FEET
2 330 000 FEET
2 370 000 FEET
Dry Creek
KANIKSU NATIONAL FOREST BOUNDARY
LIMIT OF SOIL SURVEY
KANIKSU NATIONAL FOREST
48°3'10"
116°7'30"
425 000 FEET
48°9'35"
116°30'00"
345 000 FEET

N

R. 1 E. | R. 2 E.

116°22'30"
48°12'30"

375 000 FEET

2 385 000 FEET

(Joins sheet 55)

(Joins sheet 60)

(Joins sheet 62)

T. 56 N.

Elliot Bay

Camp Bay

Memaloose Island

LAKE PEND OREILLE

KANIKSU NATIONAL FOREST BOUNDARY

KANIKSU NATIONAL FOREST

DAVID THOMPSON STATE GAME PRESERVE

Denton Slough

Sheepherder Point

116°52'30"
48°54'00"

T. 64 N.

(Joins inset, sheet 1)

R. 4 W. | R. 3 W.

250 000 FEET

2 375 000 FEET

2 635 000 FEET

2 630 000 FEET

KANIKSU NATIONAL FOREST BOUNDARY

KANIKSU NATIONAL FOREST

Trapper Creek

(Joins sheet 2)

48°52'30"
116°46'00"

48°10'00"
116°15'00"

230 000 FEET

350 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

380 000 FEET

(Joins inset, sheet 47)

R. 2 E.

116° 7'30"

48°12'45"

(Joins sheet 61) (Joins sheet 54)

2 385 000 FEET

KANIKSU NATIONAL FOREST

KANIKSU NATIONAL FOREST

Spring Creek

Howe Mountain

Denton Slough

KNF

LAKE PEND OREILLE

North Fork

Lightning Creek

Spring Creek

water

T. 58 N.

2 375 000 FEET

48°10'00"

116°15'00"

(Joins sheet 68)

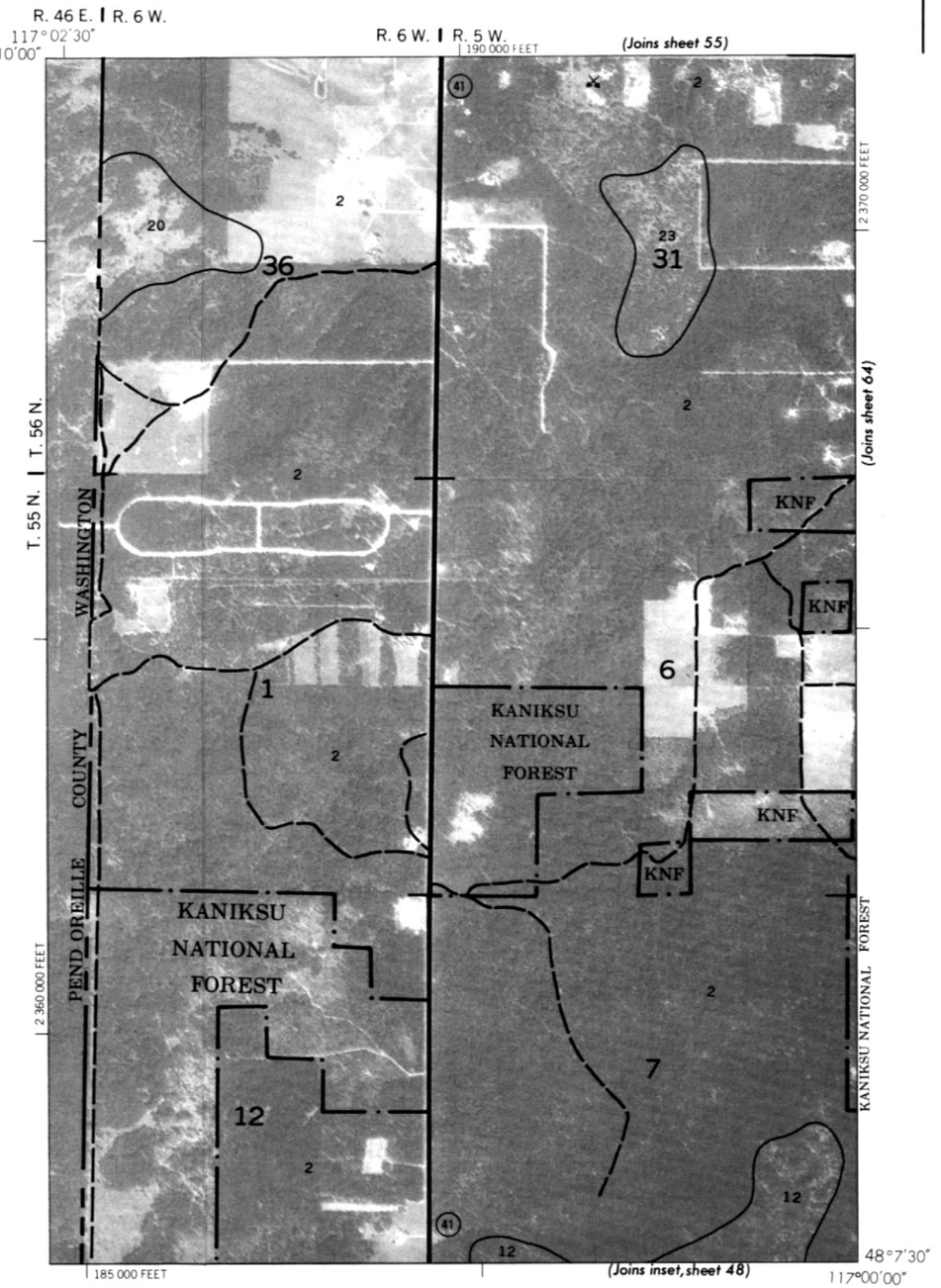
405 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

195 000 FEET

(Joins sheet 56)

R. 5 W. | R. 4 W.

116°52'30"

48°10'00"

2 370 000 FEET

(Joins sheet 63)

T. 55 N. | T. 56 N.

(Joins sheet 65)

2 360 000 FEET

48°7'30"

117°00'00"

(Joins sheet 70)

225 000 FEET

KANIKSU NATIONAL FOREST

KNF

Strong Creek

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

116°52'30"

48°10'00"

R. 4 W. | R. 3 W.

265 000 FEET

2 370 000 FEET

T. 56 N. | T. 55 N.

(Joins sheet 57)

(Joins sheet 66)

(Joins sheet 64)

2 360 000 FEET

230 000 FEET

(Joins sheet 71)

48°7'30"

116°45'00"

THE SETTLEMENT

Thama

BURLINGTON NORTHERN

KANIKSU NATIONAL FOREST

KNF

PEND OREILLE RIVER

HOODOO VALLEY

Horn Mountain

Hoodoo Creek

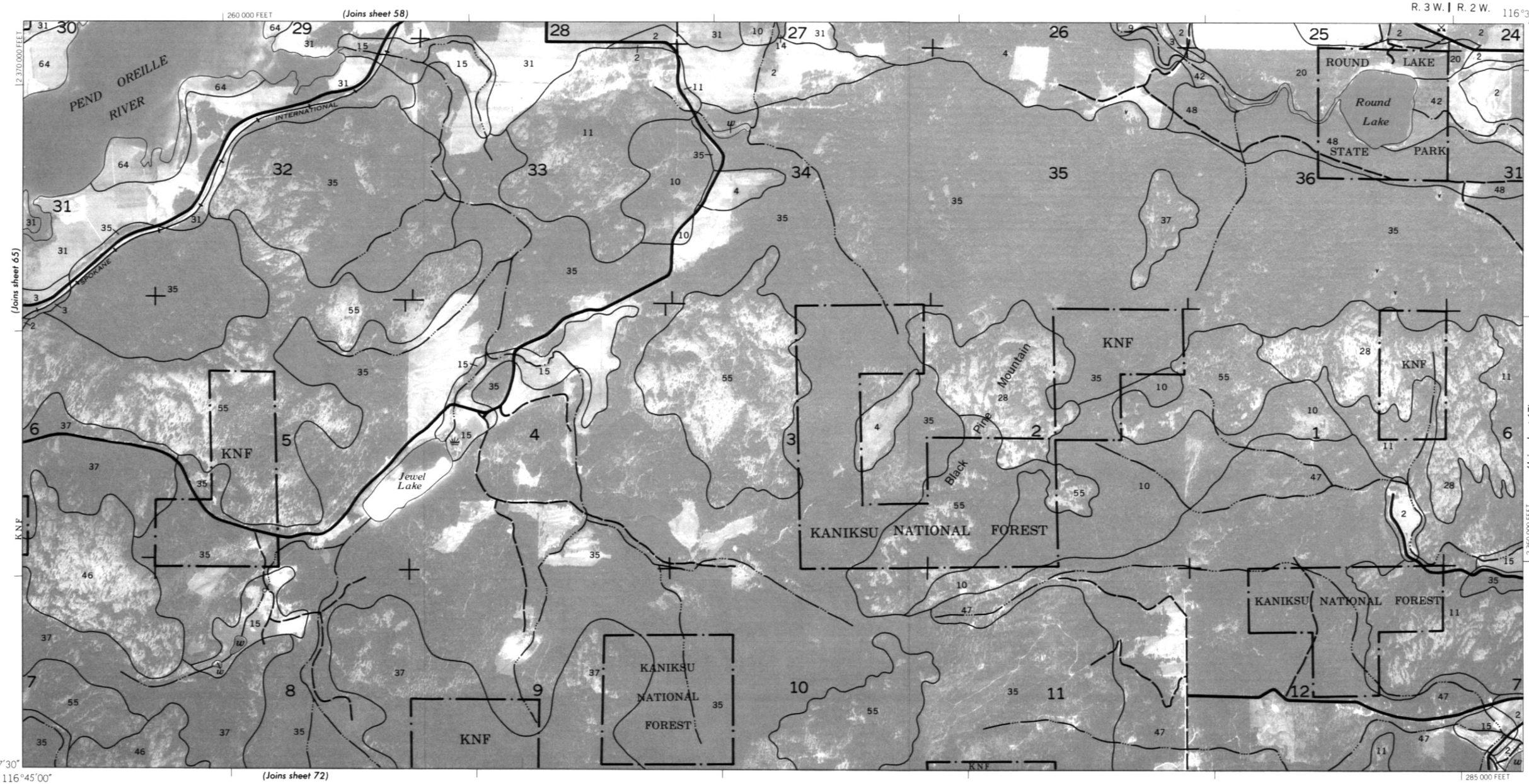
INTERNATIONAL

SPOKANE

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

48°10'00"
116°37'30"

R. 2 W. | R. 1 W.

315 000 FEET

(Joins sheet 59)

T. 55 N. | T. 56 N.

2 370 000 FEET

(Joins sheet 66)

2 360 000 FEET

290 000 FEET

(Joins sheet 73)

48°7'30"
116°30'00"

Dufort

Westmond

Cocolalla Creek

Creek

Westmond Creek

Bridgeview Creek

Mirror Lake

COCOLALLA LAKE

KANIKSU NATIONAL FOREST

KANIKSU NATIONAL FOREST BOUNDARY

PACIFIC NORTHERN

95

int

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 2 E. | R. 3 E.

380 000 FEET

(Joins sheet 62)

116°7'30"

48°10'00"

2 370 000 FEET

T. 55 N. | T. 56 N.

LAKE PEND OREILLE

KANIKSU NATIONAL FOREST

KANIKSU NATIONAL FOREST BOUNDARY

MIDDLE FORK

NORTH FORK

SOUTH FORK

CLARK FORK

Spring Creek

Lightning Creek

Mosquito Creek

Derr Island

Clark Fork

Antelope Lake

water

(Joins sheet 69)

2 355 000 FEET

48°07'30"

116°15'00"

(Joins inset, sheet 42)

405 000 FEET

57

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

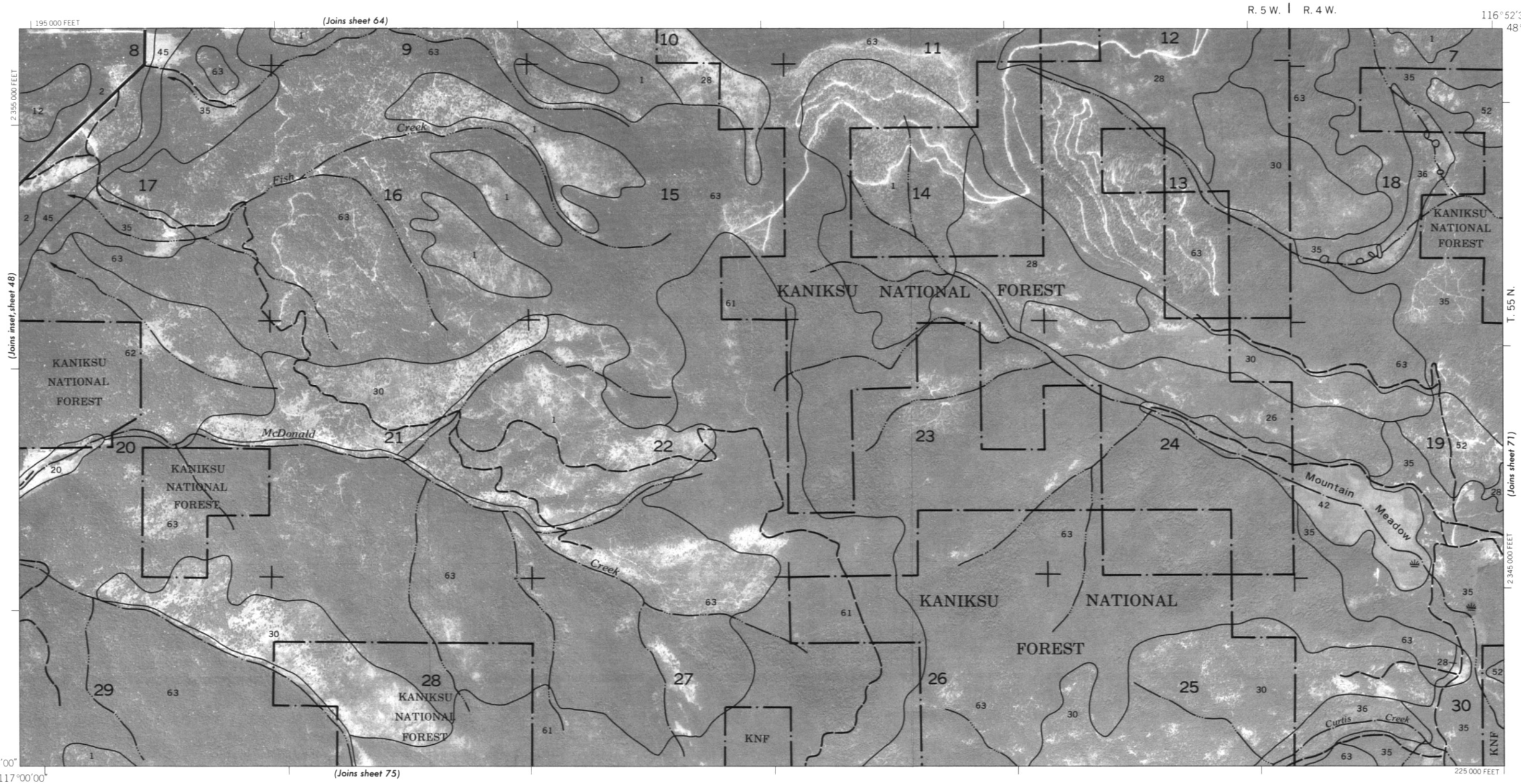
SCALE 1:24 000

N

116°7'30"
48°10'00"
R. 3 E.
420 000 FEET
T. 56 N.
T. 55 N.
2 365 000 FEET
KANIKSU NATIONAL FOREST
KANIKSU NATIONAL FOREST BOUNDARY
KANIKSU NATIONAL FOREST
KANIKSU NATIONAL FOREST
Gold Creek
(Joins sheet 68)
2 355 000 FEET
410 000 FEET
(Joins sheet 74)
48°7'30"
116°4'00"

116°15'00"
48°25'00"
R. 2 E.
385 000 FEET
T. 59 N.
T. 58 N.
Rapid Lightning Creek
KANIKSU NATIONAL FOREST
Trapper Creek
KANIKSU NATIONAL FOREST BOUNDARY
Flume Creek
(Joins sheet 32)
2 460 000 FEET
2 450 000 FEET
(Joins sheet 37)
380 000 FEET
48°22'30"
116°12'30"

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

116°52'30"
48°7'30"

(Joins sheet 65)

R. 4 W. | R. 3 W.

255 000 FEET

2 355 000 FEET

(Joins sheet 72)

T. 55 N.

2 345 000 FEET

(Joins sheet 70)

225 000 FEET

(Joins sheet 76)

48°5'00"
116°45'00"

Horn Mountain

VALLEY

HOODOO

Creek

Curtis

Hoodoo

Vay

INTERNATIONAL

SPOKANE

KANIKSU NATIONAL FOREST

KNF

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 3 W. | R. 2 W.

116°37'30"

48°7'30"

260 000 FEET

(Joins sheet 66)

2 355 000 FEET

KNF

(Joins sheet 71)

KANIKSU NATIONAL FOREST

Coco-lalla Lake

Fish Creek

Cocolalla

Huckleberry Mountain

NORTHERN PACIFIC

T. 55 N.

(Joins sheet 73)

2 345 000 FEET

48°5'00"

116°45'00"

(Joins sheet 77)

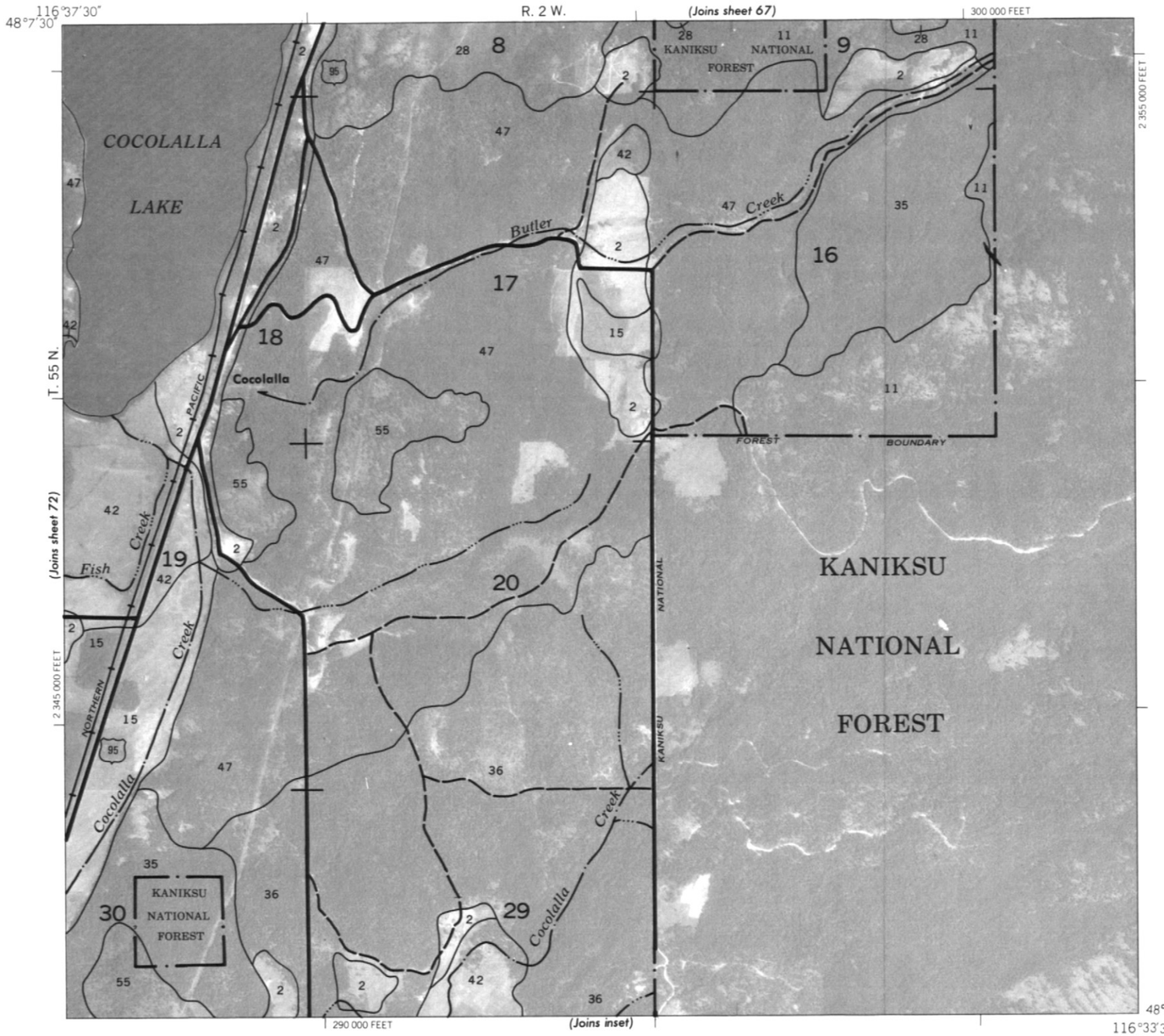
285 000 FEET

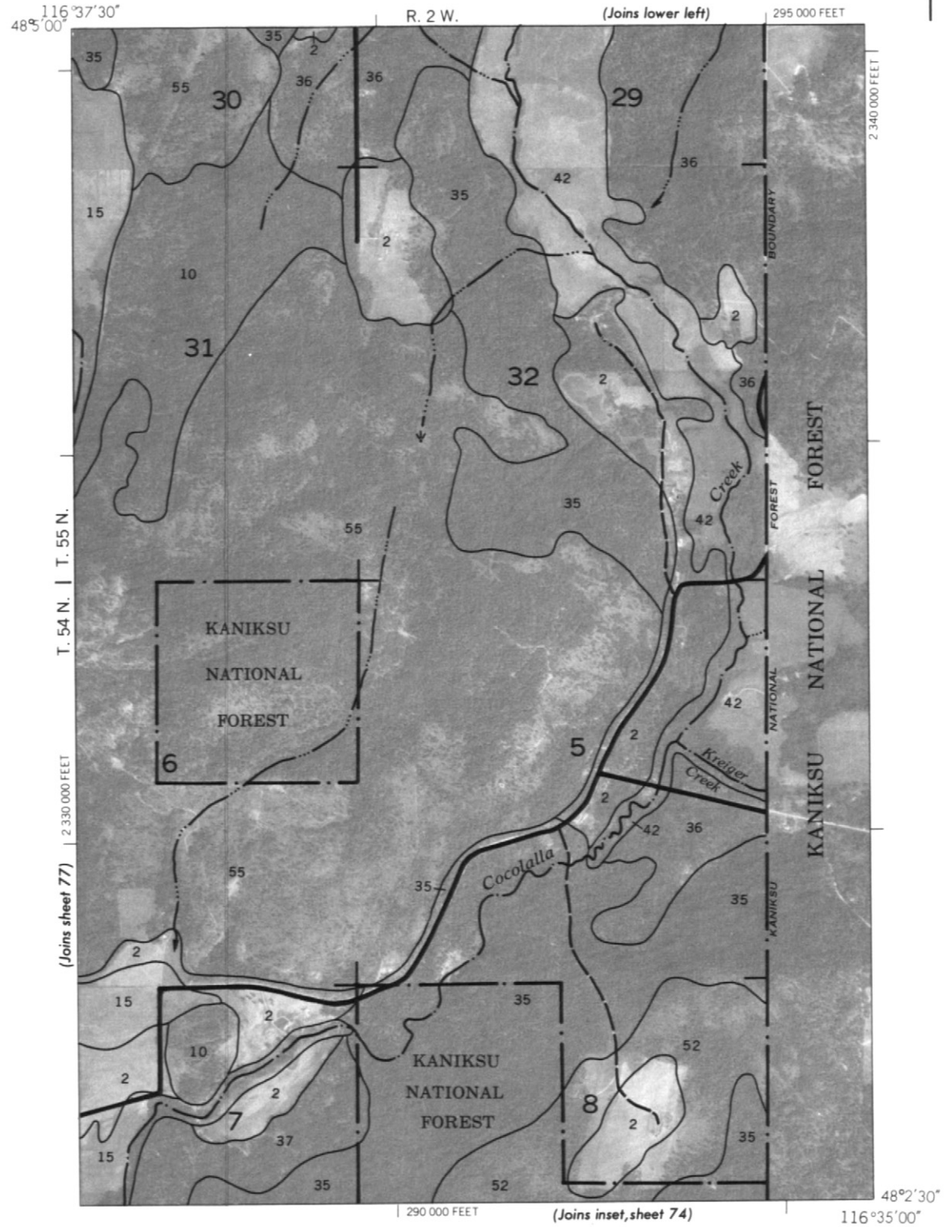
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N





1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 3 E. | R. 34 W.

410 000 FEET (Joins sheet 69) 116° 02'45" 48° 7'30"

(Joins inset, sheet 42) 2 350 000 FEET

T. 55 N.

KANIKSU NATIONAL FOREST

KANIKSU NATIONAL FOREST BOUNDARY

KNF

Gold Creek

Schlieght Lake

MONTANA

SANDERS COUNTY

CLARK FORK

NORTHERN PACIFIC

Cabinet

CABINET GORGE DAM

2 340 000 FEET

48° 5'00" 116° 7'30" (Joins inset, sheet 60) 425 000 FEET

(Joins inset, sheet 73) 290 000 FEET R. 2 W. 116°35'00" 48° 02'30"

2 325 000 FEET

(Joins sheet 80)

KANIKSU NATIONAL FOREST

Beaver Creek

Carey Wood Creek

LIMIT OF SOIL SURVEY

KANIKSU NATIONAL FOREST BOUNDARY

T. 54 N.

2 315 000 FEET

48° 00'00" 116° 37'30" (Joins inset, sheet 83) 295 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 5 W. | R. 4 W.

117° 00′ 00″

48° 5′ 00″

(Joins sheet 70)

220 000 FEET

KNF

2 340 000 FEET

T. 55 N. | T. 54 N.

(Joins inset, sheet 55)

2 330 000 FEET

(Joins sheet 76)

195 000 FEET

(Joins sheet 78)

48° 02′ 30″

116° 52′ 30″

KANIKSU NATIONAL FOREST

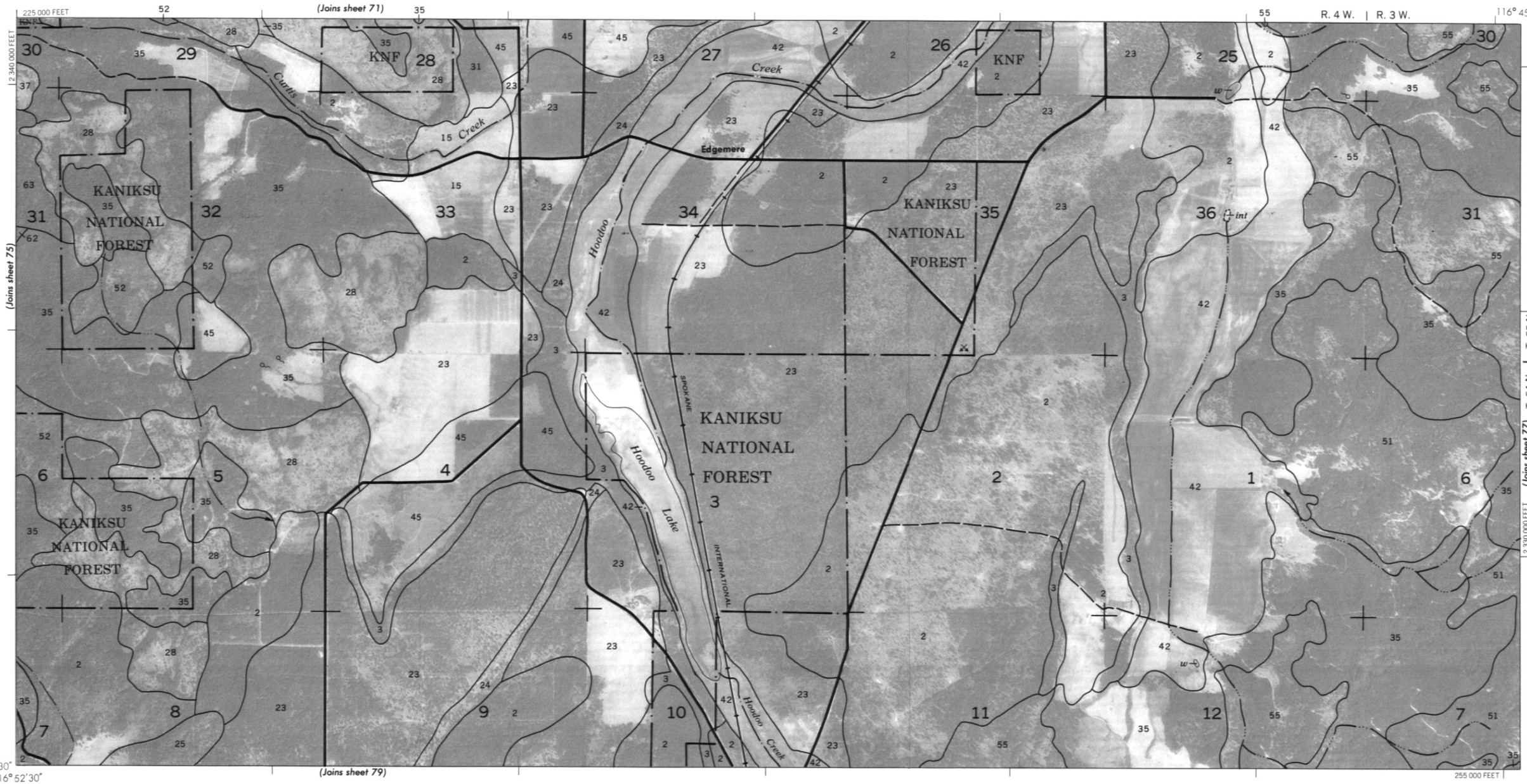
HOODOO MOUNTAIN

Curtis Creek

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

77

N

116° 45'00"
48°5'00"

R. 3 W. | R. 2 W.

285 000 FEET

(Joins sheet 72)

KANIKSU NATIONAL FOREST

KANIKSU NATIONAL FOREST

KNF

KNF

KNF

Long Mountain

Huckleberry Mountain

Lambertson Lake

Cocolalla Creek

PACIFIC NORTHERN

95

int

T. 55 N. | T. 54 N.

(Joins sheet 76)

2 330 000 FEET

2 340 000 FEET

(Joins inset, sheet 73)

260 000 FEET

(Joins sheet 80)

48° 02'30"
116° 37'30"

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

195 000 FEET

(Joins sheet 75)

R. 5 W. | R. 4 W.

116° 52'30"

48° 02'30"

2 325 000 FEET

(Joins inset, sheet 63)

T. 54 N.

(Joins sheet 79)

2 315 000 FEET

KANIKSU NATIONAL FOREST

KANIKSU NATIONAL FOREST

SPIRIT VALLEY

Blanchard

Blanchard Creek

Blanchard Lake

Spirit Creek

Coleman

Meiser Drain

CHICAGO MILWAUKEE ST. PAUL AND PACIFIC

48° 00'00"

117° 00'00"

(Joins sheet 81)

220 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

116°52'30"
48°02'30"

(Joins sheet 76)

R. 4 W. | R. 3 W.

255 000 FEET

T. 54 N.

KANIKSU NATIONAL FOREST

KNF

Harlem

SPOKANE INTERNATIONAL

water

Hoodoo Creek

Clagstone

KANIKSU NATIONAL FOREST

KNF

2 325 000 FEET

(Joins sheet 80)

(Joins sheet 78)

2 315 000 FEET

225 000 FEET

(Joins sheet 82)

48°00'00"
116°45'00"

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 3 W. | R. 2 W.

116° 37'30"

48° 02'30"

260 000 FEET

(Joins sheet 77)

2 325 000 FEET

(Joins sheet 79)

T. 54 N.

(Joins sheet 74)

2 315 000 FEET

Beaver Lake

KANIKSU NATIONAL FOREST

Careywood

Cocolalla Creek

PACIFIC

NORTHERN

Round Lake

Kelso Lake

Granite

Granite Lake

Hoodoo Creek

KANIKSU NATIONAL FOREST

48° 00'00"

116° 45'00"

(Joins sheet 83)

285 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 5 W. | R. 4 W.

117° 00′ 00″
48° 00′ 00″

220 000 FEET

(Joins sheet 78)

2 310 000 FEET

(Joins inset, sheet 17)

(Joins sheet 82)

T. 54 N.

T. 53 N.

2 300 000 FEET

KANIKSU NATIONAL FOREST

KANIKSU NATIONAL FOREST

KANIKSU NATIONAL FOREST

Pitz Mountain

Meldet Draw

Strong Draw

Poirrer Creek

Spring Creek

Spirit Creek

CHICAGO MILWAUKEE ST. PAUL AND PACIFIC

KOOTENAI COUNTY

195 000 FEET

47° 57′ 30″
116° 52′ 30″

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

225 000 FEET

(Joins sheet 79)

R. 4 W. | R. 3 W.

116° 45'00"

48° 00'00"

2 310 000 FEET

(Joins sheet 81)

T. 54 N.

(Joins sheet 83)

T. 53 N.

2 300 000 FEET

KANIKSU NATIONAL FOREST

KOOTENAI COUNTY

INTERNATIONAL BOUNDARY

Sheep Springs

47° 57'30"

116° 52'30"

255 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

116°45'00"
48°00'00"

R. 3 W. | R. 2 W.

285 000 FEET

(Joins sheet 80)

2 310 000 FEET

(Joins inset)

T. 54 N.

T. 53 N.

(Joins sheet 82)

2 300 000 FEET

KANIKSU NATIONAL FOREST

KOOTENAI COUNTY

NORTHERN PACIFIC

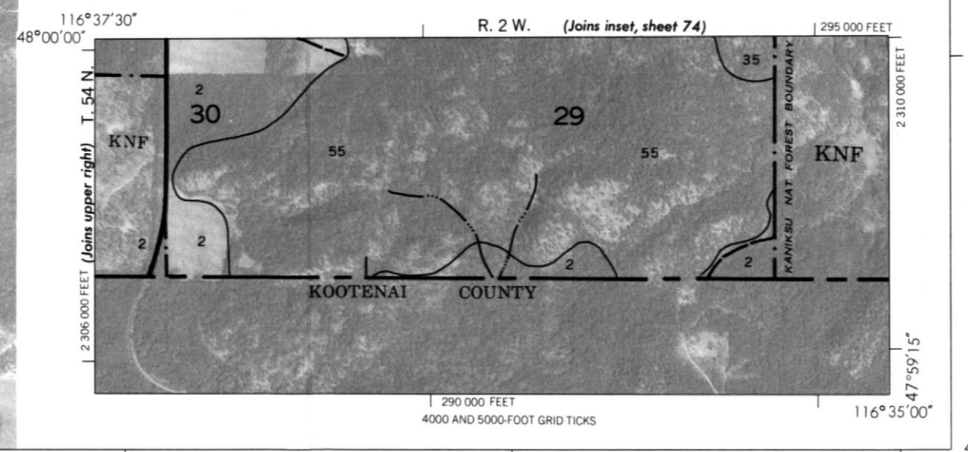
SPOKANE INT.

int

255 000 FEET

116°37'30"

47°57'30"



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000